ABBREVIATIONS

-A-

A/E	ARCHITECT / ENGINEER
AAHX	AIR TO AIR HEAT EXCHANGER
AB	AIR BLENDER
AAV	AUTOMATIC AIR VENT
ACC	AIR COOLED CONDENSER
ACCH	AIR COOLED CHILLER
ACCU	AIR-COOLED CONDENSING UNIT
ACU	AIR CONDITIONING UNIT
ACD	AUTOMATIC CONTROL DAMPER,MODULATING
ACD-TP	AUTOMATIC CONTROL DAMPER, TWO POSITION
AD	ACCESS DOOR
AF	AFTER FILTER
AFCV	AIR FLOW CONTROL VALVE
AFF	ABOVE FINISHED FLOOR
AFMD	AIR FLOW MEASURING DEVICE
AFW	AIR FOIL WHEEL (FAN)
AHU	AIR-HANDLING UNIT
AMP	AMPERAGE
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE
AS	AIR SEPARATOR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AW	AIR WASHER
AXF	AXIAL FLOW

-B-

B	BOILER
BD	BUTTERFLY DAMPER
BDD	BACKDRAFT DAMPER
BDR	BASE BOARD RADIATOR
BFP	BACKFLOW PREVENTER
BFT	BOILER PLANT FIRE TUBE
BG	BOTTOM GRILLE
BHP	BRAKE HORSEPOWER
BHW	HOT WATER HEATING BOILER
BHX	BOILER BLOWDOWN HEAT EXCHANGER
BIW	BACKWARD INCLINED WHEEL (FAN)
BMT	BONE MARROW TRANSPLANT
BR	BOTTOM REGISTER
BSC	BIOLOGICAL SAFETY CABINETS
BT	BLOWOFF TANK
BTC	BLOWOFF TANK CONTROL VALVE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BWT	BOILER PLANT WATER TUBE

-C-

C	CENTIGRADE (CELSIUS)
CC	COOLING COIL
CCD	COOLING COIL CONDENSATE DRAIN
CD	CEILING DIFFUSER
CD-1	CONSTRUCTION DOCUMENT (SUBMISSION1)
CD-2	CONSTRUCTION DOCUMENT (SUBMISSION2)
CENT	CENTRIFUGAL
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CFT	CUBIC FEET
CFP	CHEMICAL FEED PUMP
CG	CEILING GRILLE
CH	CHILLER
CHP	CHILLED WATER PUMP
CHW	CHILLER WATER
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CI	CAST IRON
CM	CARBON MONOXIDE
CM	CUBIC METER
CM/S	CUBIC METER PER SECOND
CO	CLEAN OUT
CO2	CARBON DIOXIDE
COMP	COMPRESSOR UNIT
COP	COEFFICIENT OF PERFORMANCE
CP	CONDENSATE PUMP
CR	CEILING REGISTER
CS	CONDENSATE STORAGE TANK
CSG	CLEAN STEAM GENERATOR
CT	COOLING TOWER
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME
CW	COLD WATER (POTABLE)
CWCC	CHILLED WATER COOLING COIL
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN (TO CT)
CWS	CONDENSER WATER SUPPLY (FROM CT)

-D-

D	DAMPER - AUTOMATIC
D-1	OUTDOOR AIR DAMPER
D-2	RETURN AIR DAMPER
D-3	RELIEF AIR DAMPER
DB	DECIBELS
Db	DRY-BULB TEMPERATURE
DD-1	DESIGN DEVELOPMENT (SUBMISSION1)
DD-2	DESIGN DEVELOPMENT (SUBMISSION2)
DDC	DIRECT DIGITAL CONTROLS
DEG	DEGREE
DF	DIFFUSER
DIA	DIAMETER
DIW	DEIONIZED WATER
DP	DEW POINT TEMPERATURE
DP	DIFFUSER PLATE
DPA	DIFFERENTIAL PRESSURE ASSEMBLY
DPS	DIFFERENTIAL PRESSURE SENSOR
DX	DIRECT EXPANSION
DXCC	DIRECT EXPANSION COOLING COIL

-E-

EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	EVAPORATIVE COOLER
ECC	ENGINEERING CONTROL CENTER
ECU	EVAPORATIVE CONDENSER UNIT
EDH	ELECTRIC DUCT HEATER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EGS	EMERGENCY GAS SHUTOFF
EGT	ENTERING GLYCOL TEMPERATURE
EH	EXHAUST HOOD
EJ	EXPANSION JOINT
EMD	END OF MAIN DRIP (STEAM)
ENT	ENTERING
ER	EXHAUST REGISTER
ERC	ELECTRIC REHEAT COIL
ERP	ELECTRIC RADIANT PANEL
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
ETO	ETHYLENE OXIDE
EUH	ELECTRIC UNIT HEATER
EWC	EVAPORATIVE WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING

-F-

F	FAHRENHEIT
F&T	FLOAT AND THERMOSTATIC
F/SDPR	COMBINATION FIRE SMOKE DAMPER
FA	FREE AREA
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT (4 PIPE)
FCUC	FAN COIL UNIT COOLING ONLY
FCUH	FAN COIL UNIT HEATING ONLY
FCW	FORWARD CURVED WHEEL (FAN)
FD	FLOOR DRAIN
FD	FIRE DAMPER
FF	FINAL FILTER
FHX	FLUE GAS/FEEDWATER HEAT EXCHANGER
FM	FLOW METER
FOP	FUEL OIL PUMP
FOT	FUEL OIL TANK
FOHX	FUEL OIL HEAT EXCHANGER
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FPTU	FAN POWERED TERMINAL UNIT
FR	FLOOR REGISTER
FRP	FIBER REINFORCED POLYESTER
FS	FLOW SWITCH
FSTAT	FREEZE STAT

-G-

GA	GAUGE
GAL	GALLONS
GH	GRAVITY HOOD
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPR	GAS PRESSURE REGULATOR
GS	GALVANIZED STEEL

-H-

H	HUMIDIFIER
H&CW	HOT & COLD WATER
HAC	HOUSEKEEPING AID CLOSET
HB	HOSE BIBB
HC	HEATING COIL
HD	HEAD
HD	HOOD
HOA	HAND/OFF/AUTOMATIC
HP	HEAT PUMP
HP	HORSEPOWER
HPDT	HIGH PRESSURE DRIP TRAP
HPR	HIGH PRESSURE RETURN (STEAM CONDENSATE)
HPS	HIGH PRESSURE SUPPLY (STEAM)
HRC	HEAT RECOVERY COIL
HRD	HEAT RECOVERY DEVICE
HRP	HYDRONIC RADIANT (CEILING) PANEL
HRW	HEAT RECOVERY WHEEL
HSTAT	HUMIDISTAT
HTM	HUMIDIFIER TERMINAL
HUM	HUMIDIFIER UNIT MOUNTED
HVU	HEATING AND VENTILATING UNIT
HW	HOT WATER
HWC	HOT WATER COIL
HWHC	HOT WATER HEATING COIL
HWP	HEATING HOT WATER PUMP
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HWUH	HOT WATER UNIT HEATER
HVD	HOISTWAY VENT DAMPER
HX	HEAT EXCHANGER
HZ	HERTZ

-I-

I/O	INPUT/OUTPUT
IAQ	INDOOR AIR QUALITY
IBT	INVERTED BUCKET TRAP
ICF	IN-LINE CENTRIFUGAL FAN
ICU	INTENSIVE CARE UNIT
ID	INSIDE DIAMETER
IFB	INTEGRAL FACE AND BYPASS
IN	INCHES
IN HG	INCHES OF MERCURY
IN WC	INCH WATER COLUMN
IN WG	INCH WATER GAUGE
IN-LB	INCH-POUND
IPLV	INTEGRATED PART LOAD VALUE
IRH	INFRARED HEATER
IS	INSECT SCREEN
IU	INDUCTION UNIT
IV	INLET VANES

-K-

kg	KILOGRAM
kg/HR	KILOGRAM PER HOUR
kPa	KILOPASCAL
kW	KILOWATT
kWh	KILOWATT HOUR

-L-

L	LITER
L/h	LITERS PER HOUR (OR LITERS/HOUR)
L/m	LITERS PER MINUTE (OR LITERS/MINUTE)
L/s	LITERS PER SECOND (OR LITERS/SECOND)
LAT	LEAVING AIR TEMPERATURE
LBS/HR	POUNDS PER HOUR
LF	LINEAR FOOT (FEET)
LGT	LEAVING GLYCOL TEMPERATURE
LH	LATENT HEAT
LPG	LIQUID PROPANE GAS
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
LPRC	LOW PRESSURE STEAM RETURN (CLEAN)
LLHX	LIQUID TO LIQUID HEAT EXCHANGER
LPS	LOW PRESSURE STEAM
LPSC	LOW PRESSURE STEAM (CLEAN)
LSD	LINEAR SLOT DIFFUSER
LTCP	LOCAL TEMPERATURE CONTROL PANEL
LVG	LEAVING
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE

-M-

M	METER, SI UNIT
M/s	METERS PER SECOND(OR METERS/SECOND)
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MB	MIXING BOX
MBH	1000 BTUH
MCA	MINIMUM BRANCH CIRCUIT AMPACITY
MER	MECHANICAL EQUIPMENT ROOM
MERV	MINIMUM EFFICIENCY REPORTING VALUE
MH	MANHOLE
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MM	MILLIMETER
MOV	MOTOR OPERATED VALVE
MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS	MEDIUM PRESSURE STEAM
MRI	MAGNETIC RESONANCE IMAGING
MTD	MEAN TEMPERATURE DIFFERENCE
MVD	MANUAL VOLUME DAMPER
MZ	MULTI-ZONE

-N-

NA	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NG	NATURAL GAS
NGFM	NATURAL GAS FLOWMETER
NO	NORMALLY OPEN
NOAA	NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
NOM	NOMINAL
NPLV	NON-STANDARD PART LOAD VALUE
NPSH	NET POSITIVE SUCTION HEAD
NTS	NOT TO SCALE

-O-

OA	OUTSIDE AIR
OAG	OUTSIDE AIR GRILLE
OAI	OUTSIDE AIR INTAKE
OD	OUTSIDE DIAMETER
OFM	OIL FLOWMETER
OR	OPERATING ROOM

-P-

P	PUMP
PA	PASCAL
PC	PUMPED CONDENSATE
PCF	POUNDS PER CUBIC FOOT (FEET)
PD	PRESSURE DROP
PEF	PROPELLER (TYPE) EXHAUST FAN
PF	PRE-FILTER
PG	PRESSURE GAGE
PGW	PROPYLENE GLYCOL-WATER (SOLUTION)
PHC	PREHEAT COIL
PPM	PARTS PER MILLION
PRS	PRESSURE REGULATING (VALVE) STATION
PRV	PRESSURE REGULATING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH – ABSOLUTE
PSIG	POUNDS PER SQUARE INCH – GAGE
PSS	PRIMARY SECONDARY SYSTEM
PSV	PRESSURE SAFETY VALVE
PTAC	PACKAGED TERMINAL AIR CONDITIONER

-R-

R/E	RETURN OR EXHAUST
RA	RETURN AIR
RAD	REFRIGERANT AIR DRYER
RAF	RADIO FREQUENCY
RAHX	ROTARY AIR HEAT EXCHANGER
RAT	RETURN AIR TEMPERATURE
RCCH	REMOTE CONDENSER CHILLER
RCU	RECIPROCATING CHILLER UNIT
RD	REFRIGERANT DISCHARGE
RDS	ROOM DATA SHEETS
REA	RELIEF AIR
RF	RETURN FAN
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RHG	REFRIGERANT HOT GAS
RL	REFRIGERANT LIQUID LINE
RLA	RUN LOAD AMPERE
RO	REVERSE OSMOSIS
RPM	REVOLUTIONS PER MINUTE
RR	RETURN REGISTER
RS	REFRIGERANT SUCTION
RTU	ROOF TOP UNIT
RV	RELIEF VALVE

-S-

SA	SUPPLY AIR
SAD	SOUND ATTENUATING DEVICE
SAT	SUPPLY AIR TEMPERATURE
SC	SHADING COEFFICIENT
SCFM	STANDARD CUBIC FEET PER MINUTE
SCI	SPINAL CODE INJURY
SCR	SILICON CONTROLLED RECTIFIER
SD	SMOKE DETECTOR
SD	SUPPLY AIR DIFFUSER
SD-1	SCHEMATIC DESIGN (SUBMISSION1)
SD-2	SCHEMATIC DESIGN (SUBMISSION2)
SDPR	SMOKE DAMPER
SDR	SMOKE DAMPER (RETURN)
SDS	SMOKE DAMPER (SUPPLY)
SEN	SENSIBLE HEAT
SF	SUPPLY FAN
SG	SUPPLY AIR GRILLE
SH	STEAM HUMIDIFIER
SHC	STEAM HEATING COIL
SI	SQUARE INCHES
SP	STATIC PRESSURE
SP GR	SPECIFIC GRAVITY
SPD	SUPPLY PROCESS AND DISTRIBUTION
SPRV	STEAM PRESSURE REDUCING VALVE
SPS	STATIC PRESSURE SENSOR
SQ FT	SQUARE FOOT (FEET)
SR	SUPPLY AIR REGISTER
SS	STAINLESS STEEL
SSHX	STEAM TO STEAM HEAT EXCHANGER
SSR	SOLID SEPARATOR
ST	STEAM TRAP
SUH	STEAM UNIT HEATER
SV	STEAM PRESSURE REDUCING VALVE
SVS	STEAM VENT SILENCER
SWHX	STEAM TO WATER HEAT EXCHANGER

-T-

T&PCV	TEMPERATURE AND PRESSURE CONTROL VALVE
TAB	TESTING, ADJUSTING, BALANCE
TD	TEMPERATURE DIFFERENCE
TDH	TOTAL DYNAMIC HEAD
TDS	TOTAL DISSOLVED SOLIDS
TG	TRANSFER GRILLE
TP	TRAP
TR	TOP REGISTER
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TU	TERMINAL UNIT
TWU	THRU-WALL UNIT

-U-

UC	UNDER CUT
UC	UNIT COOLER
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORY
UON	UNLESS OTHERWISE NOTED
URV	UPBLAST UNIT VENTILATOR

-V-

V	VALVE
VAF	VANE-AXIAL FAN
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
VHA	VETERANS HEALTH ADMINISTRATION
VI	VIBRATION ISOLATOR
VIV	VARIABLE INLET VANES
VP	VACUUM PUMP
VPS	VARIABLE PRIMARY SYSTEM
VR	VACUUM (STEAM CONDENSATE) RETURN
VSD	VARIABLE SPEED DRIVE
VTR	VENT THRU ROOF
VUH	VERTICAL UNIT HEATER

-W-

W	WATTS
WAG	WASTE ANESTHESIA GAS
Wb	WET-BULB (TEMPERATURE)
WC	WATER COOLED
WCCH	WATER COOLED CHILLER
WCCU	WATER COOLED CONDENSING UNIT
WCHP	WATER COOLED HEAT PUMPS
WCPU	WATER COOLED PACKAGED UNIT
WEF	WALL EXHAUST FAN
WF	WATER FILTER
WFCV	WATER FLOW CONTROL VALVE
WFM	WATER FLOWMETER
WFMD	WATER FLOW MEASURING DEVICE
WG	WATER GAGE
WPD	WATER SIDE PRESSURE DROP

-Y-

YR	YEAR

SYMBOLS (AS APPLICABLE)

ANNOTATION

Symbol	Description
1 SYMBOLS / M-201 SCALE: NOT TO SCALE	TITLE MARK DETAIL OR PLAN NUMBER - 1 DETAIL OR PLAN REFERENCE LOCATION FOUND IN M-201
1 / M-501	SECTION MARK A2T SECTION NUMBER - 1 SECTION FOUND IN M-301
2 / B	DETAIL BOUNDARY B DETAIL NUMBER - 2
1	SHEET KEYNOTE
1	REVISION CLOUD (DELTA 1)
1 / M-501	DETAIL REFERENCE DETAIL NUMBER - 1 DETAIL FOUND IN M-301
XXXXX / XXXXX	FEEDER TAG
M / 1	EQUIPMENT TAG, DESCRIPTION M, MARK NUMBER 1
1.0 FA	LOUVER IN DOOR, MINIMUM 1.0 SQUARE FOOT FREE AREA
CNDS	CONDENSATE
UC	UNDERCUT DOOR
	POINT OF CONNECTION
	POINT OF DISCONNECTION

DUCT

Symbol	Description
SA	SINGLE LINE DUCTWORK (NEW)
(E)SA	SINGLE LINE DUCTWORK (EXISTING)
(D)SA	SINGLE LINE DUCTWORK (EXIST. TO BE DEMOLISHED)
SA	DOUBLE LINE DUCTWORK (NEW)
(E)SA	DOUBLE LINE DUCTWORK (EXISTING)
(D)SA	DOUBLE LINE DUCTWORK (EXISTING TO BE DEMOLISHED)
SA / SA	DUCTWORK WITH ACOUSTIC LINING
	DUCT UNDER POSITIVE PRESSURE SUPPLY DUCT OR FAN DISCHARGE
	DUCT UNDER NEGATIVE PRESSURE RETURN, EXHAUST OR OUTSIDE AIR
UP	RISE IN DUCTWORK (IN DIRECTION OF AIR FLOW)
DN	DROP IN DUCTWORK (IN DIRECTION OF AIR FLOW)
	REHEAT COIL
	DUCT TRANSITION
	VANED ELBOW
	RADIUS ELBOW
	DUCT FITTING (SEE DETAILS)

Symbol	Description
	FLEXIBLE DUCT CONNECTION
	TRANSFER AIR BOOT (STRAIGHT) (SEE SCHEDULE FOR REQUIREMENTS)
	TRANSFER AIR DUCT ELBOW WITH ACOUSTIC LINING
SA	SOUND ATTENUATOR

AIR TERMINALS

Symbol	Description
CD-A 100	CEILING SUPPLY DIFFUSER, TYPE A, THROW PATTERN 4-WAY, 100 CFM
CR-A 100	CEILING RETURN REGISTER (GRILLE), TYPE A, 100 CFM
EG-A 100	CEILING EXHAUST, TYPE A, 100 CFM
	CEILING SUPPLY WITH BLANKING PLATE
	EXISTING CEILING SUPPLY TO REMAIN
	EXISTING CEILING RETURN TO REMAIN
	EXISTING CEILING EXHAUST TO REMAIN
	LINEAR SLOT DIFFUSER
12X6 WR 150	12"X6" SIDEWALL SUPPLY REGISTER, 150 CFM
12X6 WG 150	12"X6" SIDEWALL RETURN/EXHAUST REGISTER, 150 CFM
	ROUND SUPPLY DIFFUSER
	ROUND RETURN DIFFUSER
	FLOOR REGISTER (GRILLE)

VAV BOX

Symbol	Description
	SINGLE DUCT VAV BOX
	SINGLE DUCT VAV BOX WITH ATTENUATOR
	SINGLE DUCT VAV WITH REHEAT
	SINGLE DUCT VAV BOX WITH REHEAT AND ATTENUATOR
	DUAL DUCT VAV BOX
	FAN POWERED VAV BOX
	SHUT-OFF VAV BOX (INLET SIZES AVAILABLE: 5",6",8",10",12",14",16")
	SHUT-OFF VAV BOX WITH HYDRONIC HEATING COIL AND OUTLET BOX

DAMPERS

Symbol	Description
	COMBINATION SMOKE/FIRE DAMPER AND ACCESS DOOR
	FIRE DAMPER AND ACCESS DOOR
	SMOKE DAMPER AND ACCESS DOOR
BDD	BACK DRAFT DAMPER
	AUTOMATIC DAMPER (PNEUMATIC)
M	AUTOMATIC DAMPER (MOTORIZED)
	VOLUME DAMPER

PIPING

Symbol	Description
HWS	NEW PIPING (HOT WATER SUPPLY)
(E)HWS	EXISTING PIPING (HOT WATER SUPPLY)
(D)HWS	EXISTING TO BE DEMOLISHED (HOT WATER SUPPLY)
CHWS	CHILLED WATER - SUPPLY (NEW)
CHWR	CHILLED WATER - RETURN
HWS	HEATING HOT WATER - SUPPLY
HWR	HEATING HOT WATER - RETURN
HTWS	HIGH TEMPERATURE WATER - SUPPLY
HTWR	HIGH TEMPERATURE WATER - RETURN
CWS	CONDENSER WATER - SUPPLY
CWR	CONDENSER WATER - RETURN
CNDS	CONDENSATE DRAIN
STM	STEAM
GS	GLYCOL SUPPLY
GR	GLYCOL RETURN
HPS	STEAM - HIGH PRESSURE
HPC	STEAM - HIGH PRESSURE CONDENSATE
MPC	STEAM - MEDIUM PRESSURE CONDENSATE
LPS	STEAM - LOW PRESSURE
LPC	STEAM - LOW PRESSURE CONDENSATE
RLL	REFRIGERATION - LIQUID LINE
RSL	REFRIGERATION - SUCTION LINE
RRV	REFRIGERATION - RELIEF VENT
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
FOV	FUEL OIL VENT
FOF	FUEL OIL FILL
DW	DOMESTIC WATER
CHF	CHEMICAL FEED

VALVES

- GATE VALVE - THREADED/FLANGED
- GLOBE VALVE - THREADED/FLANGED
- GATE VALVE WITH 3/4" HOSE ADAPTER
- CHECK VALVE
- WYE STRAINER (WITH BALL VALVE & HOSE CONNECTION)
- WYE STRAINER WITH VALVED DRAIN AND QUICK-COUPLE HOSE CONNECTOR
- FLEXIBLE CONNECTION
- ANGLE GLOBE VALVE
- BUTTERFLY VALVE
- BALL VALVE
- MODULATING CONTROL VALVE
- MODULATING CONTROL BUTTERFLY VALVE
- TWO POSITION CONTROL VALVE
- THREE-WAY MODULATING CONTROL VALVE
- THREE-WAY TWO POSITION CONTROL VALVE
- PRESSURE REGULATING VALVE
- PRESSURE SAFETY VALVE
- AUTOMATIC BALANCING CONTROL VALVE
- WATER BALANCE DEVICE
- CIRCUIT SETTER VALVE
- GATE VALVE WITH GLOBE-VALVED BYPASS
- PLUG VALVE
- CONTROL VALVE (CV) - FLOAT-OPERATED
- PRESSURE REDUCING VALVE (PRV)
- LC — WATER LEVEL CONTROLLER
- M — FLOW METER

OTHER

Symbol	Description
BFP	BACKFLOW PREVENTER
	BASKET STRAINER
	DUPLEX BASKET STRAINER
CV	CONTROL VALVE STATION
PRV	PRESSURE REDUCING VALVE STATION
	"Y" TYPE STRAINER
	DRAIN VALVE
	THERMOMET ER GAUGE
	TRAP (TYPE AS NOTED)
	PUMP
A	AQUASTAT
TT	TEMPERATURE TRANSMITTER
	PIPE ALIGNMENT GUIDE
X	PIPE ANCHOR
	DIRECTION OF PIPE PITCH (DOWN)
	DIRECTION OF FLOW
	ANCHOR
	REDUCER OR INCREASER
	ECCENTRIC REDUCER
	TOP CONNECTION, 45° OR 90°
	BOTTOM CONNECTION, 45° OR 90°
	SIDE CONNECTION
	CAPPED OUTLET
	RISE OR DROP IN PIPE
	UNION
	PIPE UP
	PIPE DOWN
	INVERTED BUCKET TRAP SET INCLUDING PIPING ACCESSORIES
	FLOAT & THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES
	THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES
	THERMOMETER
	PRESSURE GAGE
FE	FLOW ELEMENT
	REFRIGERANT SIGHT GLASS
	TEST PLUG (PRESSURE/TEMPERATURE)
AV	AUTOMATIC AIR VENT
MV	MANUAL AIR VENT
	QUICK-COUPLE HOSE CONNECTOR
T	THERMOSTAT
S	WALL SWITC H
H	HUMIDISTAT
H	HUMIDIFIER
SD	SMOKE DETECTOR
P	PRESSURE SENSOR
FS	FLOW SWITCH
PS	PRESSURE SWITCH
CO_2	CARBON DIOXIDE SENSOR

GENERAL NOTES

1. ALL DUCTWORK, INSULATION, EQUIPMENT AND INSTALLATION SHALL CONFORM, AS A MINIMUM, TO THE LATEST EDITION OF ASHRAE 90.1 AND ALL OTHER APPLICABLE FEDERAL CODES AND REQUIREMENTS, GOVERNING AUTHORITIES HAVING JURISDICTION.
2. LOCATION OF PIPING & DUCTWORK IS APPROXIMATE. ALL DRAWINGS AND LAYOUTS ARE DIAGRAMMATIC TO SHOW DESIGN INTENT ONLY. CONTRACTOR TO COORDINATE ALL DUCTWORK AND PIPING WITH ALL OTHER NEW WORK AND EXISTING CONDITIONS. IF FIELD CONDITIONS DIFFER SIGNIFICANTLY FROM THOSE SHOWN ON THE DRAWINGS AND AFFECT MECHANICAL WORK, INFORM ARCHITECT OR ENGINEER IMMEDIATELY BEFORE PROCEEDING WITH THAT AREA.
3. CONTRACTOR SHALL NOTE THE CRITICAL SPACE AVAILABLE ABOVE CEILINGS. PROVIDE TRANSITION PIECES AT CROSSOVERS, UNDER BEAMS, OVER/UNDER PIPES, AS REQUIRED TO ACCOMMODATE DUCTS WITHIN SPACE AVAILABLE, PROVIDING EQUIVALENT DUCT SIZE TO THE DIAMETER SHOWN. COORDINATE CLOSELY WITH OTHER SECTIONS TO REDUCE NECESSITY OF TRANSITIONS TO A MINIMUM. NO ADDITIONAL COSTS WILL BE PAID FOR ANY REQUIRED TRANSITIONS OR OTHER SPECIAL CHANGE SHAPE PIECES.
4. VERIFY WITH ENGINEER EXACT LOCATION OF CEILING DIFFUSERS, RETURN GRILLES.
5. PROVIDE VOLUME DAMPERS IN EACH SUPPLY AIR BRANCH DUCT TO THE OUTLETS, AS FAR AWAY FROM OUTLET AS POSSIBLE, AND ALL OTHER LOCATIONS AS INDICATED. INSTALL PREFERABLY AT THE BRANCH TAKEOFF.
6. CONTRACTOR SHALL OBTAIN AND FOLLOW ALL DEPARTMENT OF VETERANS AFFAIRS GUIDELINES, RULES AND PROCEDURES FOR CONSTRUCTION. CONTRACTOR SHALL PROVIDE INSURANCE IN ACCORDANCE WITH THE DEPARTMENT OF VETERANS AFFAIRS CERTIFICATE OF INSURANCE REQUIREMENTS.
7. WHERE CONNECTING FLEXIBLE DUCTWORK TO CEILING DIFFUSERS AND CEILING REGISTERS, SIZE OF BRANCH & FLEXIBLE DUCT SHALL BE SAME SIZE AS NECK OF CEILING DIFFUSER OR CEILING REGISTER. MAXIMUM LENGTH TO BE 6'-0" LONG.
8. ROOM THERMOSTATS SHALL BE CENTERED BESIDE THE LIGHT SWITCHES UNLESS OTHERWISE NOTED. CONTRACTOR TO VERIFY EXACT LOCATIONS WITH ARCHITECT. MOUNT THERMOSTATS AT 48" ABOVE THE FLOOR.
9. CONTRACTOR TO PROVIDE (4) COPIES OF OPERATING AND MAINTENANCE MANUAL FOR OWNER'S USE FOR EACH PIECE OF EQUIPMENT. EACH ITEM SHALL BE CROSS-REFERENCED AND NUMBERED WITH AS-BUILT DESCRIPTIONS.
10. RETURN AIR IS ACCOMPLISHED VIA DUCTED RETURN GRILLES UNLESS OTHERWISE NOTED.
11. ALL DUCTWORK SHALL BE GALVANIZED STEEL. ALL DUCT CONSTRUCTION, INSULATION OR LINING SHALL BE IN ACCORDANCE WITH "SMACNA" HVAC DUCT CONSTRUCTION STANDARDS, LATEST EDITION. ALL DUCTS TO BE SEALED WITH SHEET METAL SCREWS AND "CODE APPROVED" DUCT SEALANT. FOR ALL VAV INLET DUCTS, FROM THE MAIN DUCT SYSTEM, CONTRACTOR SHALL USE "HIGH PRESSURE" DUCT SEALANT. NO DUCT TAPE IS ALLOWED FOR THIS PROJECT.
12. SUPPORT ALL DUCTS AND HVAC EQUIPMENT PER THE "SEISMIC DESIGN MANUAL, SMACNA GUIDELINES FOR MECHANICAL SYSTEMS", LATEST EDITION.
13. AIR BALANCE SHALL BE PERFORMED TO FAN COIL UNITS, OA DUCTS, AIRFLOW DIFFUSERS, AND EXHAUST FAN BALANCING SHALL BE DOCUMENTED ON "AABC" FORMS. CONTRACTOR SHALL PROVIDE INDEPENDENT AABC AIR & WATER BALANCE & REPORTS BY LICENSED AABC AIR AND WATER BALANCE CONTRACTOR.
14. AREAS ABOVE RETURN GRILLES SHALL BE PAINTED FLAT BLACK TO MASK "SEE THROUGH" EFFECT OR ANY LIGHT REFLECTION.
15. RUN ALL DUCTS AS TIGHT AS POSSIBLE TO BOTTOM OF STRUCTURE, UNLESS OTHERWISE NOTED. DUCT DIMENSIONS SHOWN ARE NET INSIDE DIMENSIONS. ALL PIPE SIZES SHOWN ARE NOMINAL PIPE DIAMETERS.
16. CONTRACTOR SHALL COORDINATE VOLTAGE AND PHASE OF EACH PIECE OF EQUIPMENT W/THE ELECTRICAL CONTRACTOR PRIOR TO ORDERING.
17. ALL SYMBOLS SHOWN ON SYMBOL LIST ARE NOT NECESSARILY USED ON THIS PROJECT.
18. CONTRACTOR TO PROVIDE CUTTING, PATCHING, AND PAINTING FOR ALL OPENINGS IN WALLS, FLOOR AND ROOF.
19. FOR DUCT DROPS BETWEEN TRUSS JOISTS, CONTRACTOR TO COORDINATE WITH STRUCTURAL ENGINEER AND ARCHITECT FOR ALL DUCT DROPS AND OPENING LOCATIONS.
20. AIR MOVING SYSTEMS SUPPLYING AIR IN EXCESS OF 2000 CFMS SHALL BE EQUIPPED WITH A AUTOMATIC SHUTOFF. AUTOMATIC SHUTOFFS SHALL BE ACCOMPLISHED BY INTERRUPTING THE POWER SOURCE OF AIR-MOVING EQUIPMENT UPON DETECTION OF SMOKE IN THE MAIN SUPPLY-AIR DUCT.
21. CONTRACTOR SHALL PROVIDE TO THE GOVERNMENT UPON REQUEST MATERIAL SAFETY DATA SHEETS (MSDS) PRIOR TO INSTALLATION OR USE OF ADHESIVES, INSULATION, SEALANTS, ETC.
22. ALL MSD'S SHALL COMPLY WITH THE OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) REQUIREMENTS.
23. ALL WASTE AND/OR DEMOLISHED MATERIALS FOUND TO CONTAIN LEAD, ASBESTOS OR POLY- CHLORINATED BIPHENYLS (PCB'S) OR OTHER HARMFUL SUBSTANCES SHALL BE HANDLED AND REMOVED IN ACCORDANCE WITH FEDERAL AND STATE LAW FOR HAZARDOUS WASTES.
24. ALL INSULATION PRODUCTS FOR HVAC SHALL MEET LEED IEQ REQUIREMENTS.
25. NO INSULATION INSTALLED FOR THE PROJECT SHALL BE OF MATERIAL MANUFACTURED USING CHLOROFLUOROCARBONS (CFC'S), NOR SHALL CFC'S BE USED IN THE INSTALLATION OF THE PRODUCT.
26. ALL INSULATING MATERIALS SHALL HAVE PROPERTIES THAT EXCEED OR MEET APPLICABLE INDUSTRY STANDARDS. POLYSTYRENE PRODUCTS SHALL MEET ASTM C578-91.

SEISMIC RESTRAINTS AND STRUCTURAL ATTACHMENTS NOTE

CONTRACTOR SHALL RETAIN A CALIFORNIA REGISTERED PROFESSIONAL STRUCTURAL ENGINEER TO PREPARE SEALED (STAMPED) DETAILS AND CALCULATIONS FOR SEISMIC RESTRAINTS, ANCHORAGES FOR SEISMIC RESTRAINTS, AND ATTACHMENTS TO STRUCTURE FOR SEISMIC RESTRAINTS AND SUPPORTS AS THEY RELATE TO THE SUPPORTS AND SEISMIC RESTRAINT OF MECHANICAL & PLUMBING PIPING WORK, DUCTWORK AND EQUIPMENT.

CONTRACTOR SHALL SUBMIT ALL SEALED (STAMPED) DETAILS AND CALCULATIONS OF SEISMIC RESTRAINTS, ATTACHMENTS TO THE STRUCTURE AND SUPPORTS FOR THE REVIEW AND APPROVAL OF THE PROJECT STRUCTURAL ENGINEER PER CONTRACT DOCUMENTS AND SPECIFICATIONS.

SHEET INDEX

100% CONSTRUCTION DOCUMENTS

SCHEMATIC DESIGN 1
Revisions: Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

HILLIARD ARCHITECTS — ESTABLISHED 1988 — GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

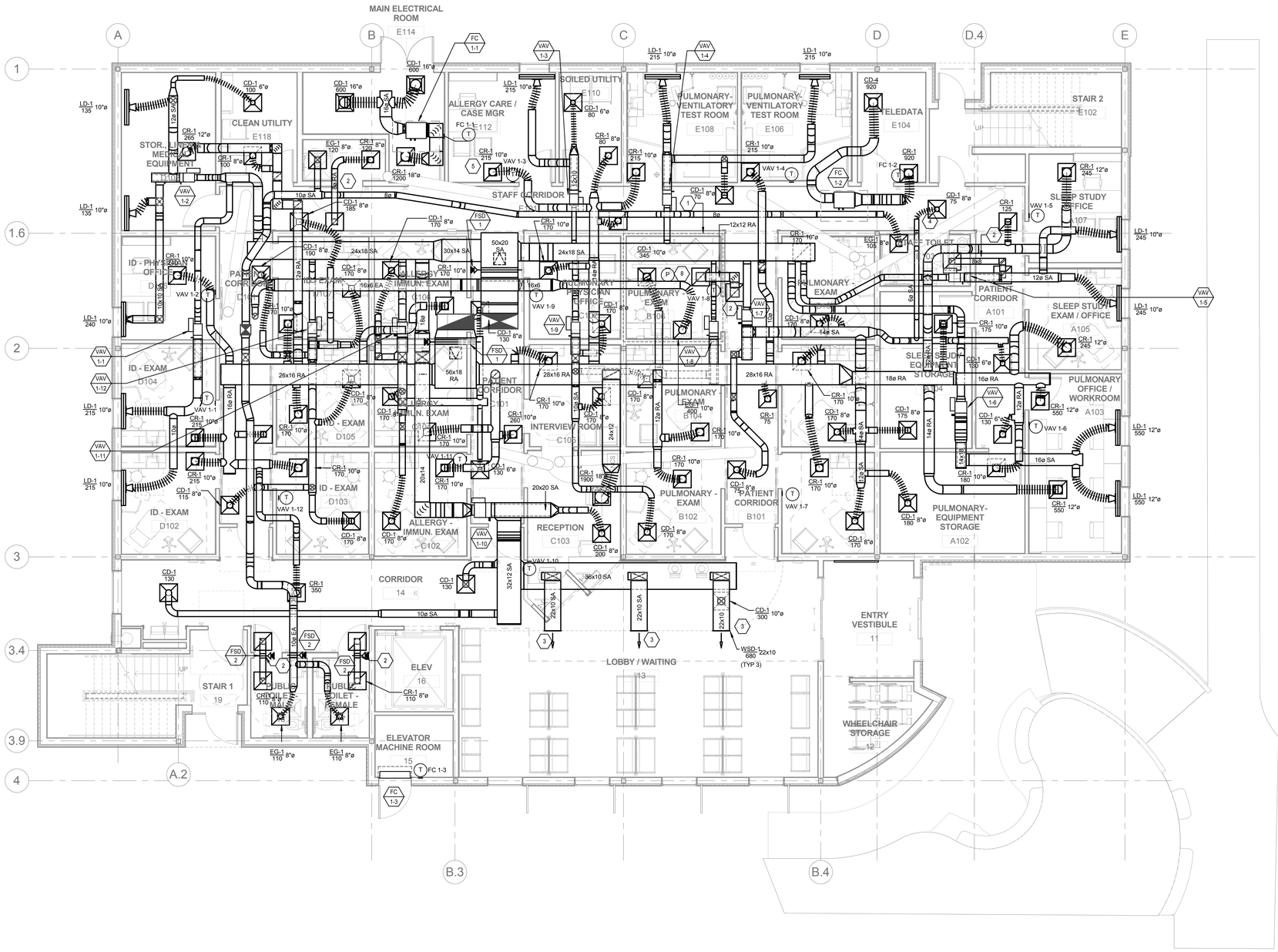
Drawing Title: **MECHANICAL COVER SHEET**
Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**
Location: VA MATHER
Date: 05/12/2014 | Checked: SHG | Drawn: SS

Project Number: 612-122
Building Number: 648
Drawing Number: **M000**
Dwg. of

Office of Construction and Facilities Management
Department of Veterans Affairs

VA FORM 08-6231



1 LEVEL 1 HVAC PLAN
3/16" = 1'-0"

NORTH

KEY NOTES:

1. ISOLATION EXAM ROOM MAINTAIN UNDER NEGATIVE PRESSURE DURING OCCUPIED HOURS. CONTROLS CONTRACTOR TO INSTALL PRESSURE INDICATOR ON EXTERIOR OF ROOM WITH DIGITAL DISPLAY. CONNECT TO DDC WITH LOW PRESSURE DIFFERENTIAL REMOTE ALARM CAPABILITY.
2. INSTALL BAROMETRIC DAMPER ON TRANSFER DUCT TO MAINTAIN MINIMUM PD AT ROOM AT ALL TIMES. INSTALL 1" INTERNAL ACOUSTICAL LINING ON TRANSFER DUCT.
3. PROVIDE BOWDIN YOUNG REGULATOR REMOTE CABLE DAMPER FOR AIR BALANCING IN AREAS WITH HARD CEILING. COORDINATE LOCATION OF CONTROLLER WITH ARCHITECT.
4. BALANCE SUPPLY AIR CFM TO PROVIDE 20 CFM TO FAN COIL RETURN AIR DUCT.
5. MOUNT FAN COIL AS HIGH AS POSSIBLE. PROVIDE SECONDARY DRAIN PAN WITH CONDENSATE DRAIN LINE. PRIMARY AND SECONDARY DRAIN LINES TO TERMINATE AT ADJACENT SINK TAILPIECE. DO NOT ROUTE DRAIN LINE OVER ELEVATOR EQUIPMENT.

SHEET NOTES:

1. ALL DUCT UPSTREAM OF VAV BOX SHALL BE 2" PRESSURE RATED. ALL DUCTWORK DOWNSTREAM OF VAV BOX TO BE 1/2" PRESSURE RATED.
2. ALL EXHAUST DUCTWORK SHALL BE 1" PRESSURE RATED.
3. ALL RETURN DUCTWORK SHALL BE 1" PRESSURE RATED.
4. FLEXIBLE DUCT SHALL NOT BE LONGER THAN 5'. FLEXIBLE DUCT SHALL ONLY BE INSTALLED AT DUCT RUNOUT CONNECTION TO DIFFUSER/GRILLE.
5. ALL PATIENT ROOMS SHALL BE CONSTRUCTED TO PROVIDE NC-35 OR LESS BACKGROUND NOISE.
6. PROVIDE AIR BALANCE ON ALL SUPPLY & RETURN GRILLES TO MEET THE ROOM AIR BALANCE TABLE REQUIREMENTS SHOWN ON SHEET M-601.
7. ALL SUPPLY, RETURN, AND EXHAUST DUCT BRANCHES SHALL HAVE MANUAL BALANCING DAMPERS. LOCATE DAMPER AS FAR BACK FROM THE DIFFUSER AS POSSIBLE IN AN ACCESSIBLE LOCATION. MANUAL DAMPERS NOT SHOWN ON FLOOR PLANS.
8. PROVIDE DIFFERENTIAL PRESSURE SENSOR TO MEASURE AND RECORD ROOM PRESSURE WITH RESPECT TO ADJACENT HALLWAY. CONNECT TO BMS FOR REMOTE ALARM.

100% CONSTRUCTION DOCUMENTS

NOT FOR CONSTRUCTION

Revisions:	Date
SCHEMATIC DESIGN	1

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

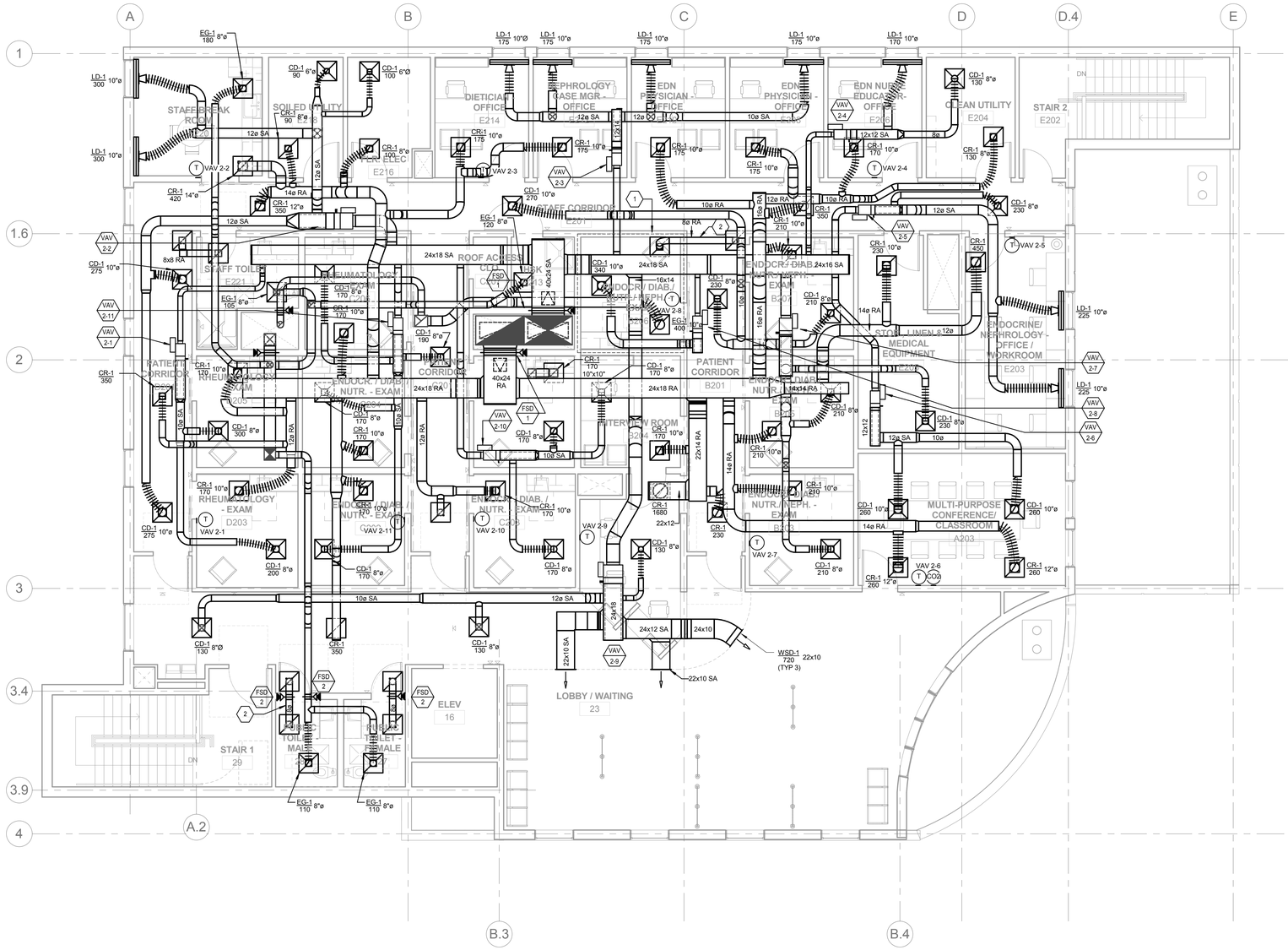
HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title	**LEVEL 1 MECHANICAL PLAN**
Approved: Project Director	
Project Title	**MED SPECIALTIES BUILDING 648**
Location	VA MATHER
Date	**05/12/2014**
Checked	**SHG**
Drawn	**JP**
Project Number	**612-122**
Building Number	
Drawing Number	**M101**
Dwg. of	

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



1 LEVEL 2 HVAC PLAN
3/16" = 1'-0"

NORTH

KEY NOTES:

1. ISOLATION EXAM ROOM MAINTAIN UNDER NEGATIVE PRESSURE DURING OCCUPIED HOURS. CONTROLS CONTRACTOR TO INSTALL PRESSURE INDICATOR ON EXTERIOR OF ROOM WITH DIGITAL DISPLAY. CONNECT TO DDC WITH LOW PRESSURE DIFFERENTIAL REMOTE ALARM CAPABILITY.
2. INSTALL BAROMETRIC DAMPER ON TRANSFER DUCT TO MAINTAIN MINIMUM PD AT ROOM AT ALL TIMES. INSTALL 1" INTERNAL ACOUSTICAL LINING ON TRANSFER DUCT.
3. PROVIDE BOWDIN YOUNG REGULATOR REMOTE CABLE DAMPER FOR AIR BALANCING IN AREAS WITH HARD CEILING. COORDINATE LOCATION OF CONTROLLER WITH ARCHITECT.
4. BALANCE SUPPLY AIR CFM TO PROVIDE 20 CFM TO FAN COIL RETURN AIR DUCT.
5. MOUNT FAN COIL AS HIGH AS POSSIBLE. PROVIDE SECONDARY DRAIN PAN WITH CONDENSATE DRAIN LINE. PRIMARY AND SECONDARY DRAIN LINES TO TERMINATE AT ADJACENT SINK TAILPIECE. DO NOT ROUTE DRAIN LINE OVER ELEVATOR EQUIPMENT.

SHEET NOTES:

1. ALL DUCT UPSTREAM OF VAV BOX SHALL BE 2" PRESSURE RATED. ALL DUCTWORK DOWNSTREAM OF VAV BOX TO BE 1/2" PRESSURE RATED.
2. ALL EXHAUST DUCTWORK SHALL BE 1" PRESSURE RATED.
3. ALL RETURN DUCTWORK SHALL BE 1" PRESSURE RATED.
4. FLEXIBLE DUCT SHALL NOT BE LONGER THAN 5'. FLEXIBLE DUCT SHALL ONLY BE INSTALLED AT DUCT RUNOUT CONNECTION TO DIFFUSER/GRILLE.
5. ALL PATIENT ROOMS SHALL BE CONSTRUCTED TO PROVIDE NC-35 OR LESS BACKGROUND NOISE.
6. PROVIDE AIR BALANCE ON ALL SUPPLY & RETURN GRILLES TO MEET THE ROOM AIR BALANCE TABLE REQUIREMENTS SHOWN ON SHEET M-601.
7. ALL SUPPLY, RETURN, AND EXHAUST DUCT BRANCHES SHALL HAVE MANUAL BALANCING DAMPERS. LOCATE DAMPER AS FAR BACK FROM THE DIFFUSER AS POSSIBLE IN AN ACCESSIBLE LOCATION. MANUAL DAMPERS NOT SHOWN ON FLOOR PLANS.

100% CONSTRUCTION DOCUMENTS
NOT FOR CONSTRUCTION

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **LEVEL 2 MECHANICAL PLAN**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **JP**

Project Number: **612-122**

Building Number:

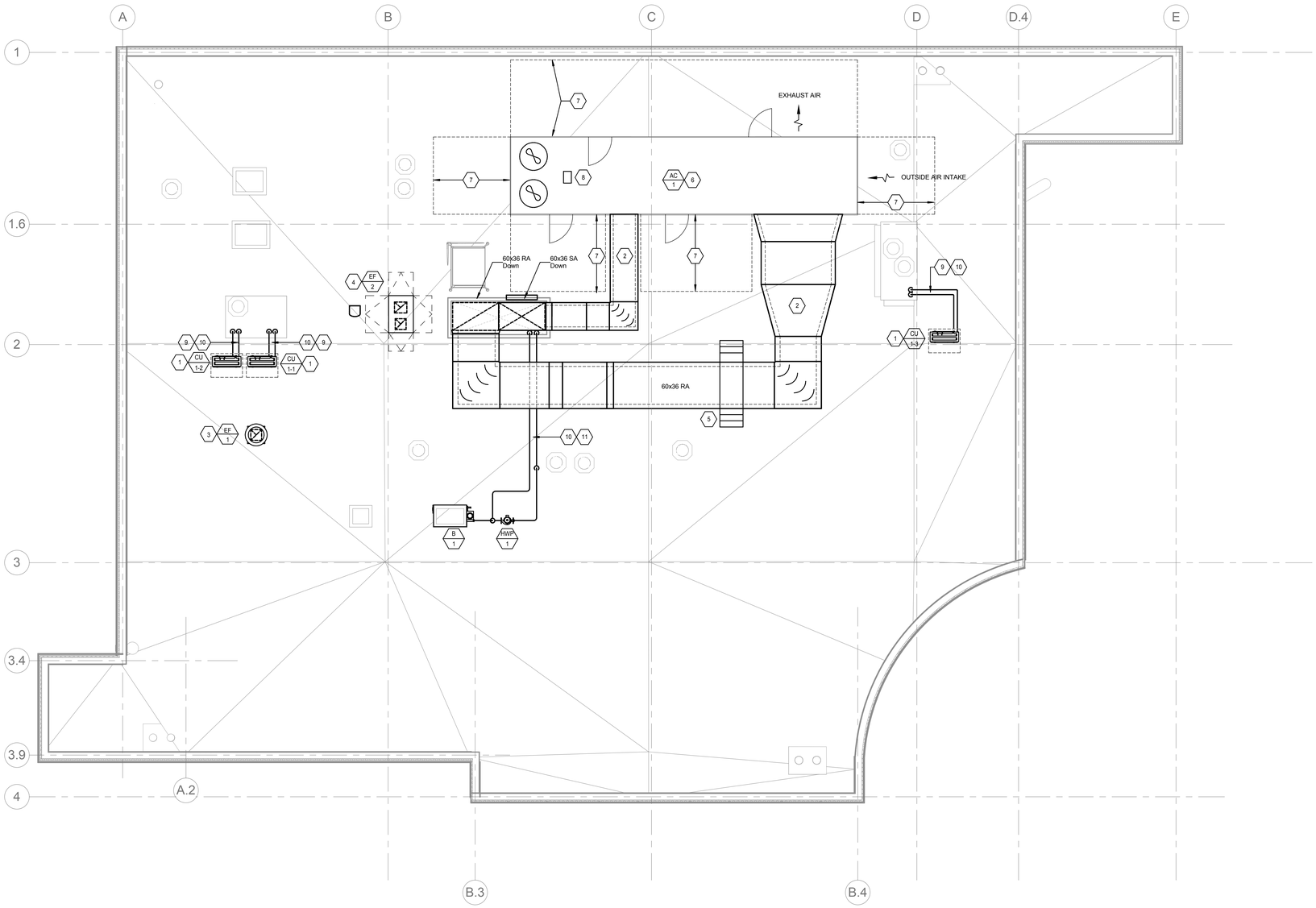
Drawing Number: **M102**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



KEY NOTES:

1. 24/7 CONDENSING UNITS.
2. INSTALL 1" INTERNAL ACOUSTICAL LINING ON ALL ROOFTOP DUCTWORK. INSTALL SLOPED EXTERNAL SHEET METAL CAP ON ALL ROOFTOP DUCTWORK.
3. GENERAL MUSHROOM EXHAUST.
4. HIGH VELOCITY EXHAUST WITH 10' VENT STACK.
5. PROVIDE CATWALK OVER 36" HIGH RETURN AIR DUCT FOR AC UNIT ACCESS. CAT WALK TO BE MINIMUM 30" WIDE.
6. AC UNIT TO HAVE 100" CLEARANCE ON ALL SIDES, BE 30" CLEAR FROM ROOF ACCESS HATCH AND 6' FROM EDGE OF ROOF.
7. 100" REQUIRED CLEARANCE.
8. EVAP COOLED MAKEUP WATER CONNECTION AT BASE OF UNIT.
9. REFRIGERANT PIPING. INSULATE PER MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.
10. APPLY ALUMINUM CLADDING ON EXTERIOR OF INSULATION FOR WATERPROOF/RADIATION BARRIER.
11. HOT WATER SUPPLY & RETURN PIPING WITH 1-1/2" INSULATION.

SHEET NOTES:

1 LEVEL 3 HVAC PLAN
3/16" = 1'-0"

NORTH

100% CONSTRUCTION DOCUMENTS
NOT FOR CONSTRUCTION

SCHEMATIC DESIGN	**1**
Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **ROOF LEVEL MECHANICAL PLAN**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **JP**

Project Number: **612-122**

Building Number:

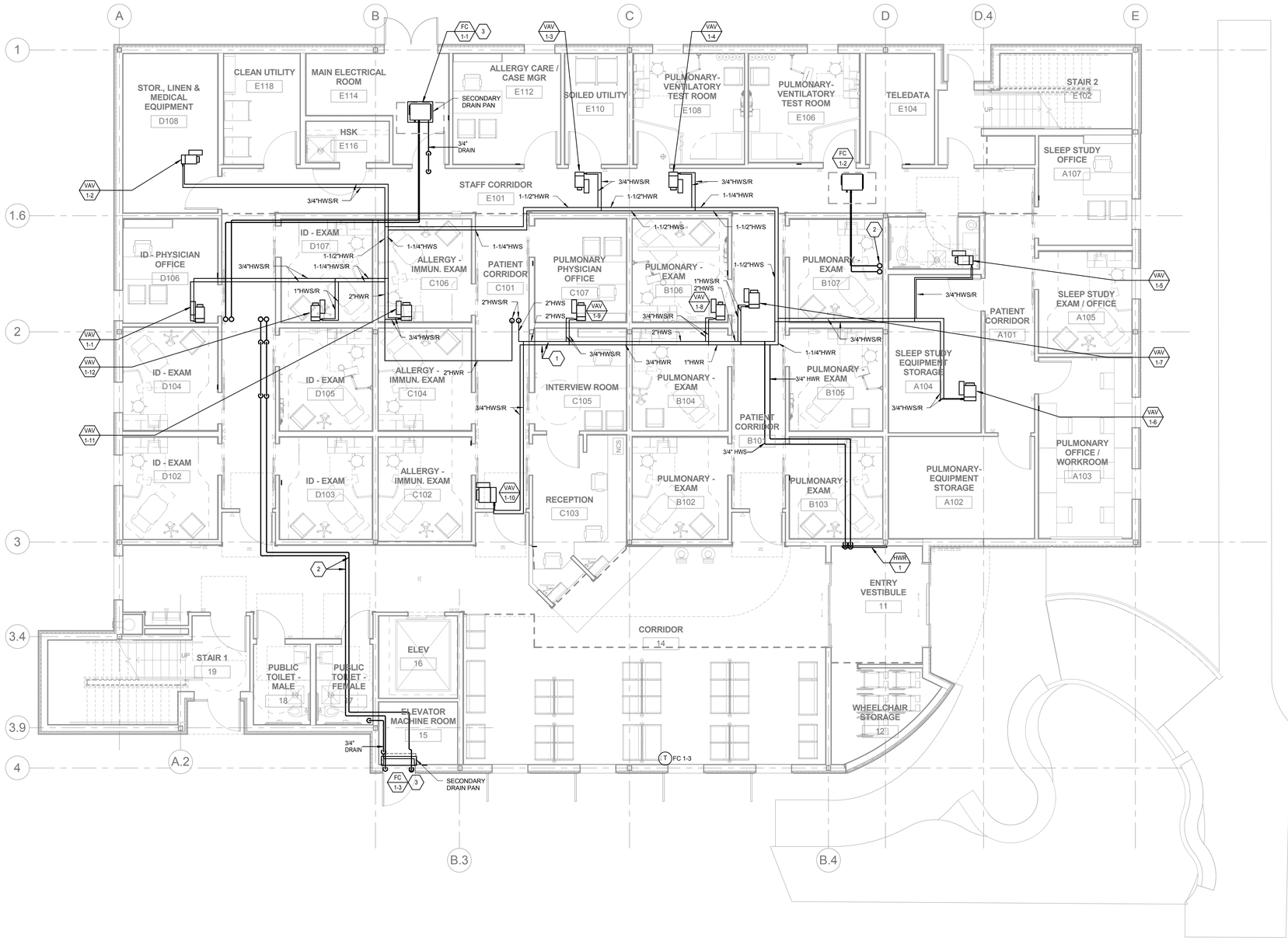
Drawing Number: **M103**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



KEY NOTES:

1. HOT WATER PIPING SUPPLY & RETURN PIPING. PROVIDE 1.5" INSULATION ON ALL PIPE 1"Ø AND LARGER. PROVIDE 1" INSULATION ON ALL PIPE LESS THAN 1"Ø.
2. REFRIGERANT PIPE SUPPLY AND RETURN. PROVIDE WITH CLOSED CELL INSULATION PER MANUFACTURER'S INSTRUCTION AND PROJECT SPECIFICATIONS.
3. SECONDARY DRAIN PAN. RUN SLOPED 3/4" DRAIN LINE FROM PAN AND PENETRATE CEILING INAPPROVED LOCATION. TERMINATE PIPE 1/2" BELOW CEILING. CONDENSATE SHOULD BE NOTICEABLE TO ALERT TENANT OF UNIT CONDENSATE PUMP FAILURE.

SHEET NOTES:

1 LEVEL 1 PIPING PLAN
3/16" = 1'-0"

NORTH

100% CONSTRUCTION DOCUMENTS

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title
LEVEL 1 MECHANICAL PIPING PLAN

Approved: Project Director

Project Title
MED SPECIALTIES BUILDING 648

Location
VA MATHER

Date	Checked	Drawn
05/12/2014	SHG	SS

Project Number
612-122

Building Number
648

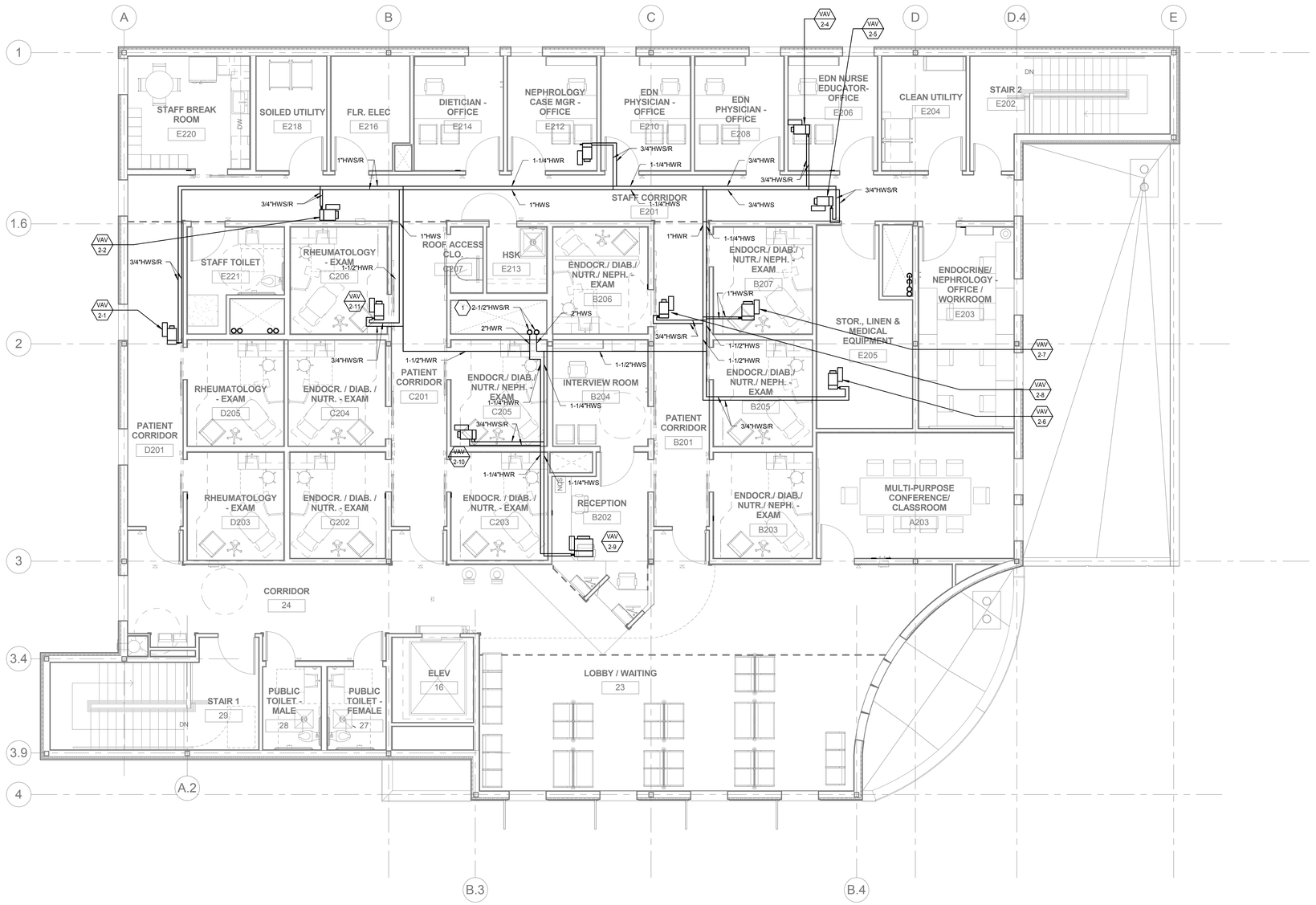
Drawing Number
MP101

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



1 LEVEL 2 PIPING PLAN
3/16" = 1'-0"

NORTH

KEY NOTES:

1. HOT WATER PIPING SUPPLY & RETURN PIPING. PROVIDE 1.5" INSULATION ON ALL PIPE 1"Ø AND LARGER. PROVIDE 1" INSULATION ON ALL PIPE LESS THAN 1"Ø.

SHEET NOTES:

100% CONSTRUCTION DOCUMENTS

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **LEVEL 2 MECHANICAL PIPING PLAN**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number: **648**

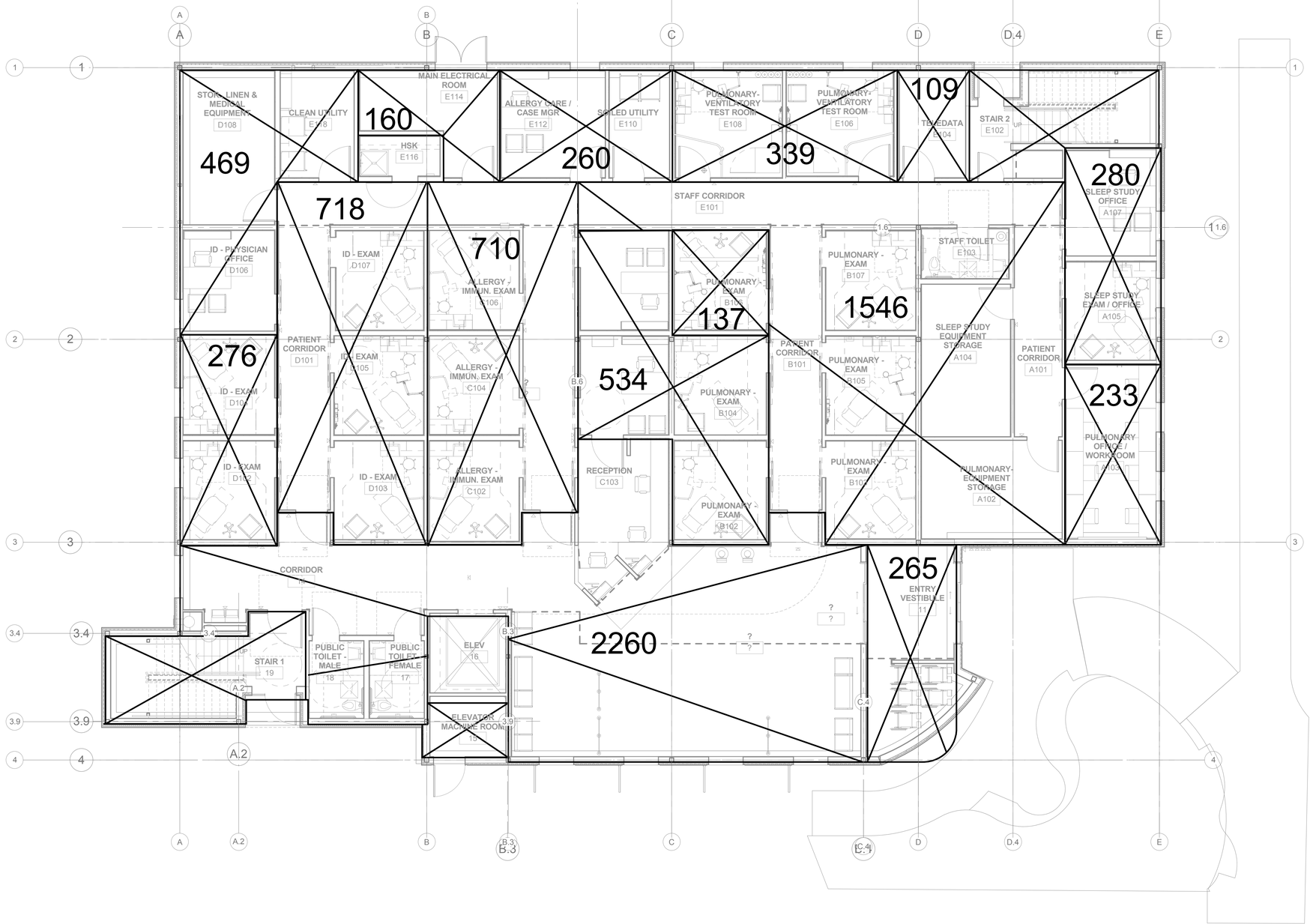
Drawing Number: **MP102**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



1 LEVEL 1 HVAC ZONE MAP
3/16" = 1'-0"

NORTH

KEY NOTES:

SHEET NOTES:

100% CONSTRUCTION DOCUMENTS
NOT FOR CONSTRUCTION

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **LEVEL 1 HVAC ZONE MAP**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number:

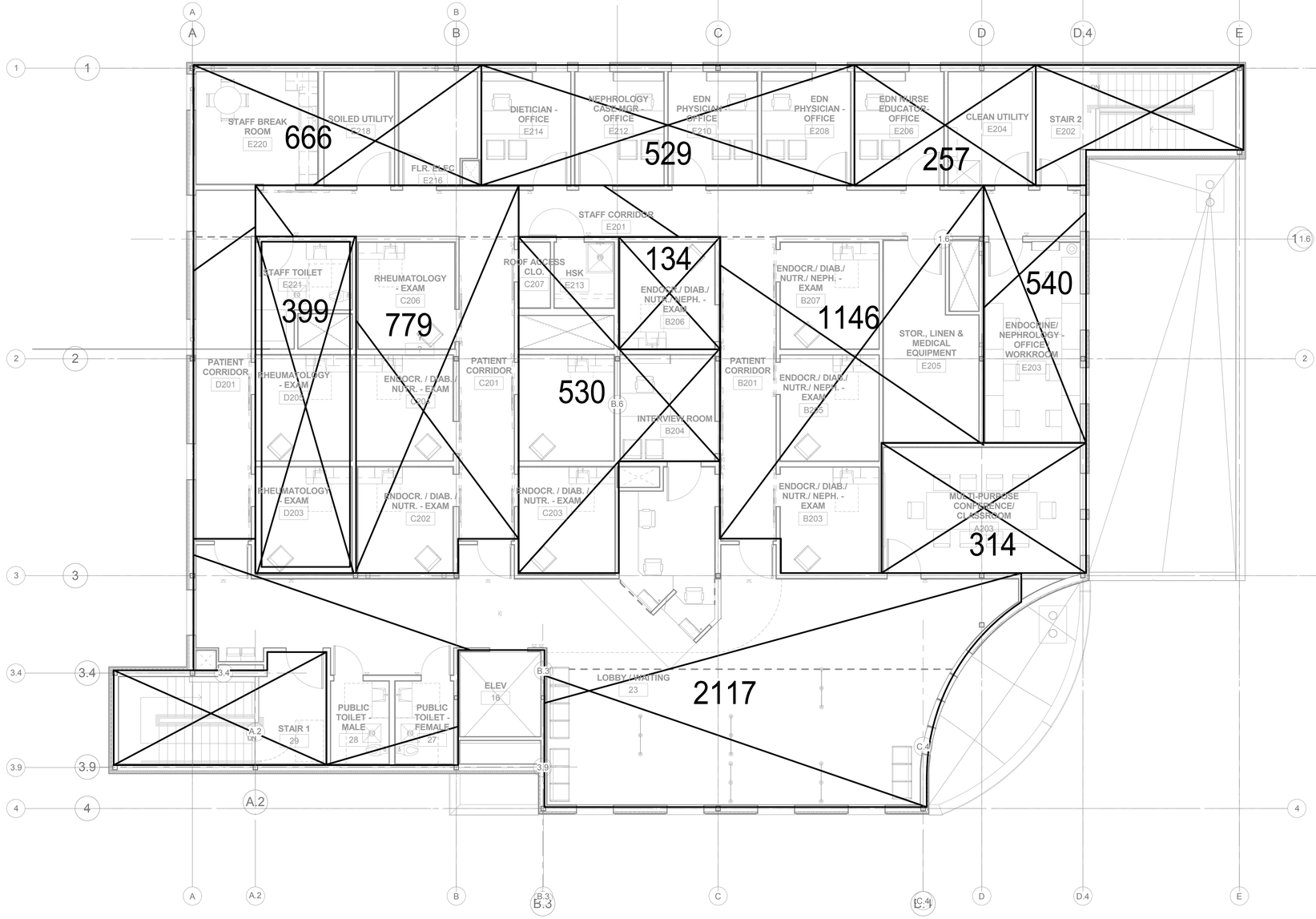
Drawing Number: **M401**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



1 LEVEL 2 HVAC ZONE MAP
3/16" = 1'-0"

NORTH

KEY NOTES:

SHEET NOTES:

100% CONSTRUCTION DOCUMENTS
NOT FOR CONSTRUCTION

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **LEVEL 2 HVAC ZONE MAP**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number:

Drawing Number: **M402**

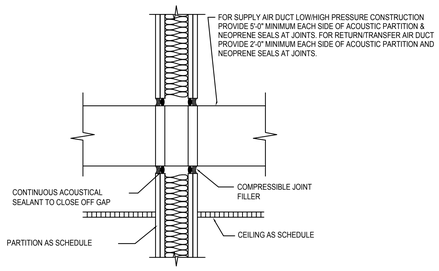
Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

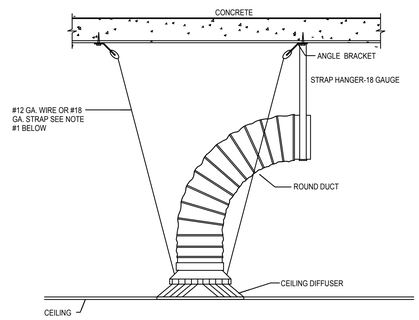
VA FORM 08-6231

DUCT THROUGH ACOUSTICAL PARTITION (10)



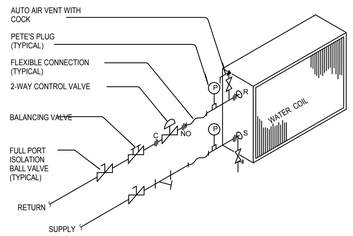
PENETRATION OF ACOUSTICAL PARTITIONS BY DUCTWORK SHALL BE ACOUSTICALLY SEALED AS SHOWN. ANY GAP LARGER THAN 1/2" SHALL BE COVERED WITH GYPSUM BOARD. LAPPED A MINIMUM OF 2" AND SCREWED BEFORE USING ACOUSTICAL SEALANT.

RETURN, EXHAUST AND TRANSFER DETAIL (7)

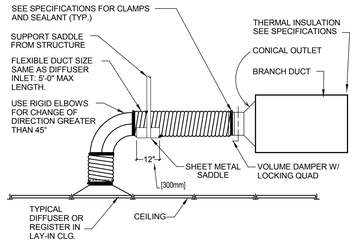


NOTES:
1. (2) #12 GAUGE WIRE BY CEILING CONTRACTOR OR #18 GAUGE 1" SHEET METAL HANGER FOR DIFFUSER/RETURN AIR GRILLE.
2. TERMINALS OR SERVICES WEIGHING 20 TO 56 LBS. SHALL BE ATTACHED TO THE CEILING SUSPENSION MAIN RUNNERS OR TO CROSS RUNNERS. IN ADDITION, SHALL HAVE TWO #12 GAGE HANGERS CONNECTED FROM THE TERMINAL OR SERVICE TO THE CEILING HANGERS OR TO THE STRUCTURE ABOVE.

HEATING COIL - 2 WAY VALVE (4)

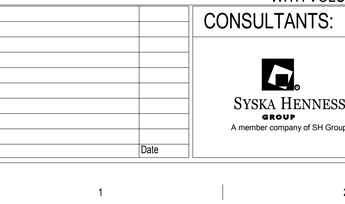


FLEXIBLE AIR DUCT CONNECTOR (1)



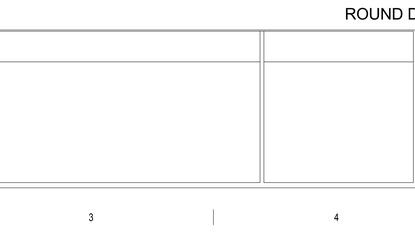
NOTE:
THE USE OF FLEXIBLE AIR DUCT CONNECTORS ARE NOT PERMITTED FOR THE DEDICATED AHU SERVING THE SURGICAL SUITE.

BRANCH TAKE-OFFS (11)



DUCT TAKE-OFF

RECTANGULAR TO ROUND DETAIL (8)

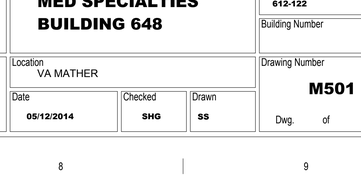


L3=LARGER OF 6" OR 0.75D
↑ #10 SCREW AT EACH CORNER
↑ #10 SCREW EVERY 3"C. ON 1" FLANGE
↑ #10 SCREW EVERY 4"C. ON 2" FLANGE

RESTRAINING CLAMP DETAIL FOR SUPPORTING PIPE ON ROOF (5)

NOTES:
PROVIDE RESTRAINING CLAMPS 8'-0" [2438] O.C.

LINEAR DIFFUSER ON LAY-IN CEILING MOLUNTING DETAIL (2)



CIRCULAR CONICAL TAP WITH VOLUME DAMPER (12)

NOTES
1. USE FOR SYMBOL WHERE BRANCH DUCT AIR QUANTITY IS LESS THAN 25% OF THE TOTAL AIR FLOW.
2. DEPTH OF MAIN DUCT MUST BE 2" LARGER THAN CONICAL DIAMETER.

ROUND DUCT HANGERS (9)

HANGER STRAPS OR RODS			
MAX. DUCT IN. [mm]	QUANTITY/SIZE IN. [mm]	MAX. LOAD LBS. [kg]	MAX. SPACING IN. [mm]
26 [650]	ONE 1 [25] x 22 GA STRAP	260 [119]	144 [3600]
36 [900]	ONE 1 [25] x 18 GA STRAP	420 [190]	144 [3600]
50 [1250]	ONE 1 [25] x 16 GA STRAP	700 [317]	144 [3600]
60 [1500]	TWO 3/8 [10] RODS	1320 [598]	144 [3600]
84 [2100]	TWO 1/2 [13] RODS	2500 [1133]	144 [3600]

NOTE:
TABULATED DATA FROM SMACNA ALLOWS FOR DUCT REINFORCING AND INSULATION, BUT NO EXTERNAL LOAD.

ROOF MOUNTED EXHAUST FAN DETAIL (6)

NOTES:
DUCT SHALL BE 1" SMALLER THAN ROOF OPENING.
ROOF OPENING SHALL CONFORM TO CURB SIZE.

VOLUME DAMPER DETAIL (3)

100% CONSTRUCTION DOCUMENTS
NOT FOR CONSTRUCTION

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL DETAILS**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number

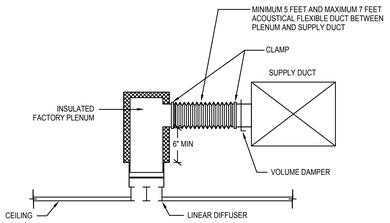
Drawing Number: **M501**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231

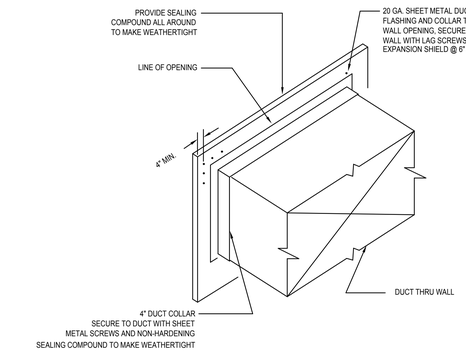


LINEAR DIFFUSER ON LAY-IN CEILING MOLUNTING DETAIL (10)

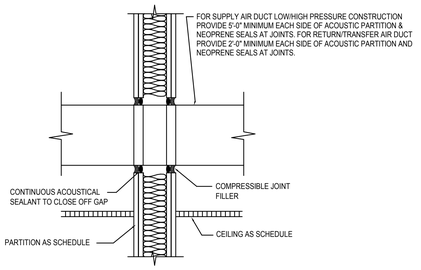
HOT WATER PIPE SIZING SCHEDULE	
GPM	PIPE SIZE (IN.)
UP TO 2.0	3/4"
2-5	1"
5-9	1 1/4"
9-15	1 1/2"
15-30	2"
30-45	2 1/2"
45-85	3"

* MINIMUM HEATING HOT WATER PIPE SIZE BASED ON 140 DEGREE HOT WATER INLET (BASED ON 2 FT / 100 FT FRICTION LOSS AND 6 FPS MAXIMUM VELOCITY)

HOT WATER PIPE SIZING SCHEDULE (7)

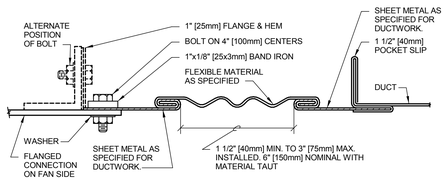


DUCT THROUGH WALL (4)

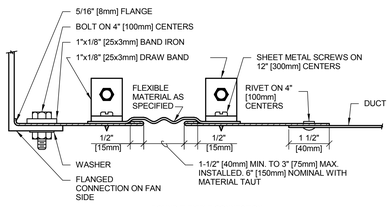


PENETRATION OF ACOUSTICAL PARTITIONS BY DUCTWORK SHALL BE ACOUSTICALLY SEALED AS SHOWN. ANY GAP LARGER THAN 1/2" SHALL BE COVERED WITH GYPSUM BOARD, LAPPED A MINIMUM OF 2" AND SCREWED BEFORE USING ACOUSTICAL SEALANT.

DUCT THROUGH ACOUSTICAL PARTITION (1)

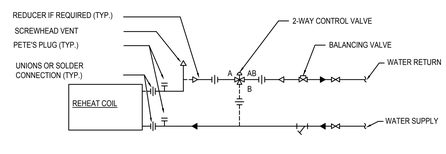


RECTANGULAR FLEXIBLE CONNECTION



ROUND FLEXIBLE CONNECTION

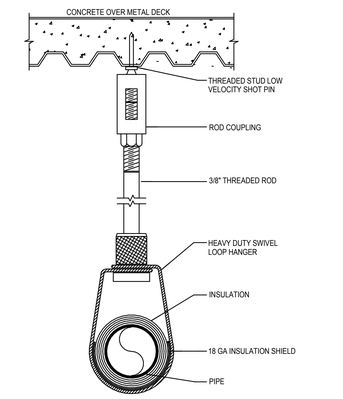
FLEXIBLE DUCT CONNECTIONS (11)



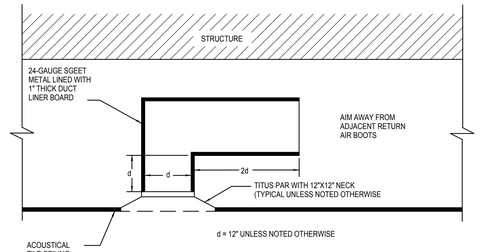
NOTES:

A STRAIGHT-THRU 2-WAY MODULATING CONTROL VALVE IS SHOWN BY SOLID PIPING. WHEN SCHEDULE INDICATES THAT A THREE-WAY MODULATING CONTROL VALVE IS REQUIRED, PROVIDE DASHED PIPING AND FITTINGS ALSO.

TYP PIPING CONN. VAV REHEAT COILS (8)

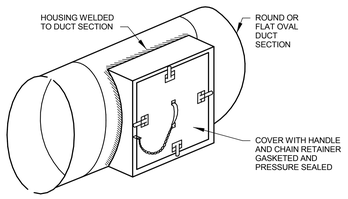


PIPE HANGING DETAIL (5)

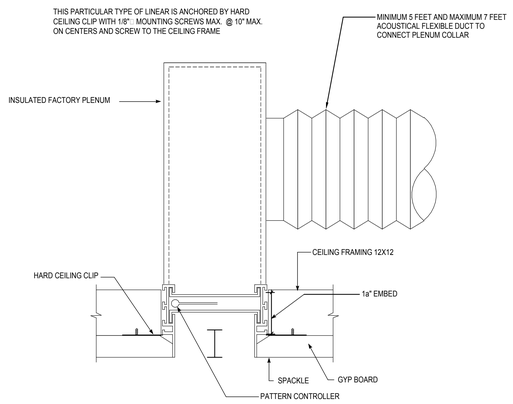


NOTE: LOCATE RETURN AIR DUCT AS FAR FROM OTHER RETURN AIR DUCTS AS POSSIBLE

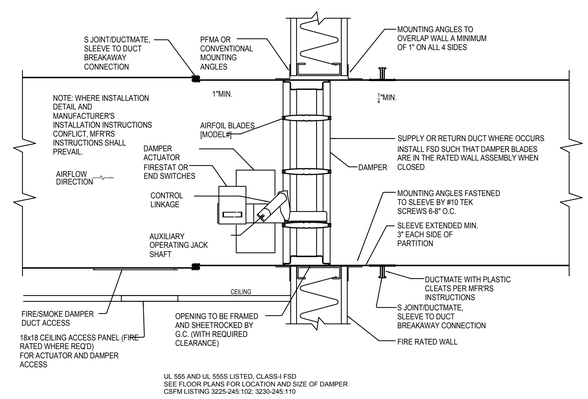
RETURN AIR DUCT BOOT (2)



ACCESS SECTION FOR ROUND/OVAL DUCT (12)

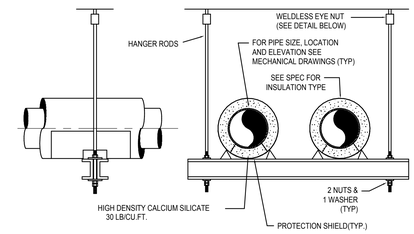


LINEAR DIFFUSER ON HARD CEILING MOUNTING DETAIL (9)



UL 555 AND UL 555S LISTED, CLASS-I FSD
SEE FLOOR PLANS FOR LOCATION AND SIZE OF DAMPER
CSFM LISTING 3225-245:102, 3230-245:110

FSD DETAIL (6)



SUPPORT NOTE:

DETAILS OF SUPPORTS AND METHOD OF ATTACHMENT TO STEEL STRUCTURE OR SLAB SHALL BE SUBMITTED TO ENGINEER FOR REVIEW PRIOR TO FABRICATION.

PIPE HANGING DETAIL (3)

100% CONSTRUCTION DOCUMENTS

NOT FOR CONSTRUCTION

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL DETAILS**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number

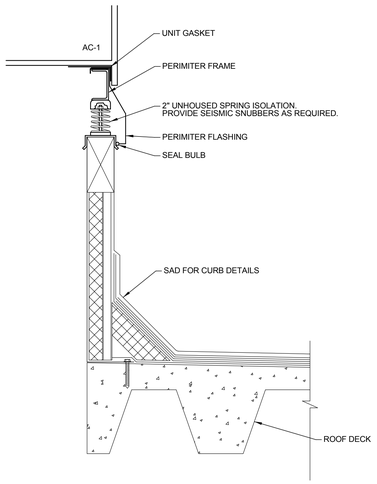
Drawing Number: **M502**

Dwg. of

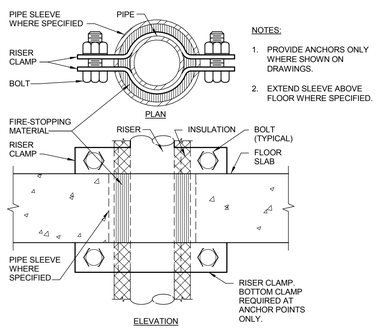
Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



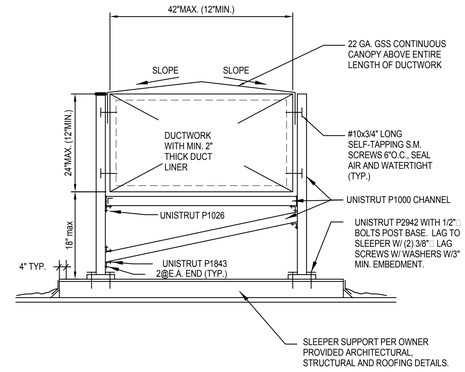
AC-1 ROOF CURB MOUNTING DETAIL (9)



NOTES:

1. PROVIDE ANCHORS ONLY WHERE SHOWN ON DRAWINGS.
2. EXTEND SLEEVE ABOVE FLOOR WHERE SPECIFIED.

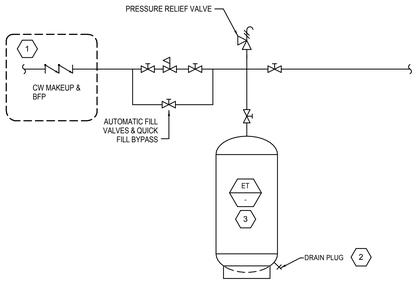
SUPPORT/ANCHOR FOR PIPE RISERS (6)



NOTES:

1. SLOPE DUCT CANOPY TO PREVENT WATER ACCUMULATION ON TOP.
2. SPACE DUCT SUPPORT AT MAXIMUM 5'-0" O.C.
3. PROVIDE MIN. 8" HIGH SLEEPER WITH FLASHING AT EACH SUPPORT.

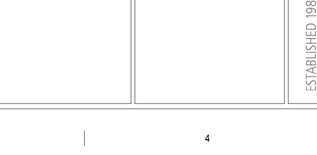
OUTDOOR EXPOSED DUCTWORK SUPPORT ON ROOF DETAIL (4)



NOTES:

1. CONNECT TO SIDE OF MAIN. (AVOID TOP OR BOTTOM CONNECTION TO PREVENT AIR OR DEBRIS FROM ENTERING PIPE TO EXPANSION TANK).
2. DRAIN VALVE REQUIRED TO PROPERLEY PRECHARGE TANK.
3. TANK CONNECTIONS MAY VARY DEPENDING ON TANK SIZE AND MODEL.

EXPANSION TANK PIPING DETAIL (1)



NOTES:

1. INSTALLATION OF SENSORS AND TRANSMITTERS SHALL CONFORM TO RECOMMENDATIONS OF MANUFACTURERS OF TRANSMITTERS.

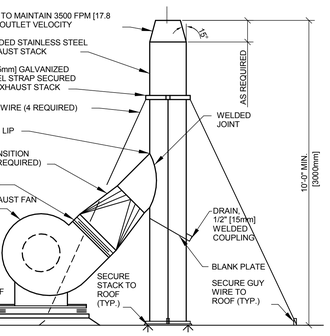
PRESSURE TRANSMITTER INSTALLATION (7)

FLOOR MOUNT EQUIPMENT RESTRAINED BY RESILIENT PADS (TYPE DS)

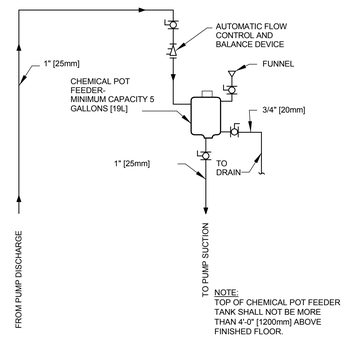
SEISMIC BRACING FOR LIGHT SUSPENDED EQUIPMENT

NOTE:
NOT REQUIRED FOR AIR TERMINAL UNITS.

SEISMIC BRACING FOR EQUIPMENT (5)

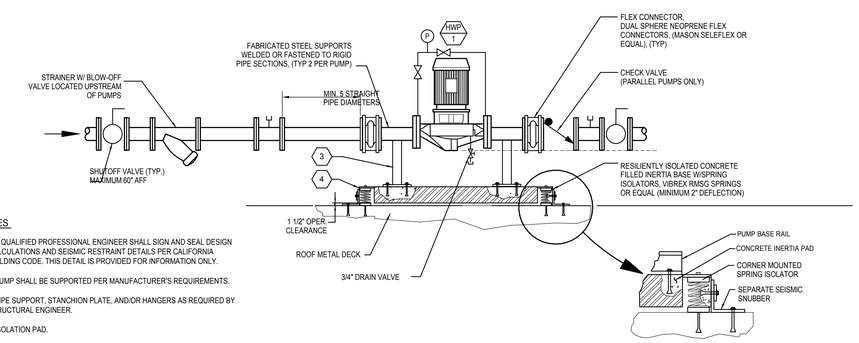


EXHAUST STACK DETAIL (2)



NOTE:
TOP OF CHEMICAL POT FEEDER TANK SHALL NOT BE MORE THAN 4'-0" [1200mm] ABOVE FINISHED FLOOR.

WATER TREATMENT - CLOSED SYSTEMS (8)



NOTES

1. A QUALIFIED PROFESSIONAL ENGINEER SHALL SIGN AND SEAL DESIGN CALCULATIONS AND SEISMIC RESTRAINT DETAILS PER CALIFORNIA BUILDING CODE. THIS DETAIL IS PROVIDED FOR INFORMATION ONLY.
2. PUMP SHALL BE SUPPORTED PER MANUFACTURER'S REQUIREMENTS.
3. PIPE SUPPORT, STANCHION PLATE, AND/OR HANGERS AS REQUIRED BY STRUCTURAL ENGINEER.
4. ISOLATION PAD.

HWP-1 INLINE PUMP PIPING & SUPPORT DETAIL (3)

100% CONSTRUCTION DOCUMENTS
NOT FOR CONSTRUCTION

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

HILLIARD ARCHITECTS ESTABLISHED 1988 GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL DETAILS**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number:

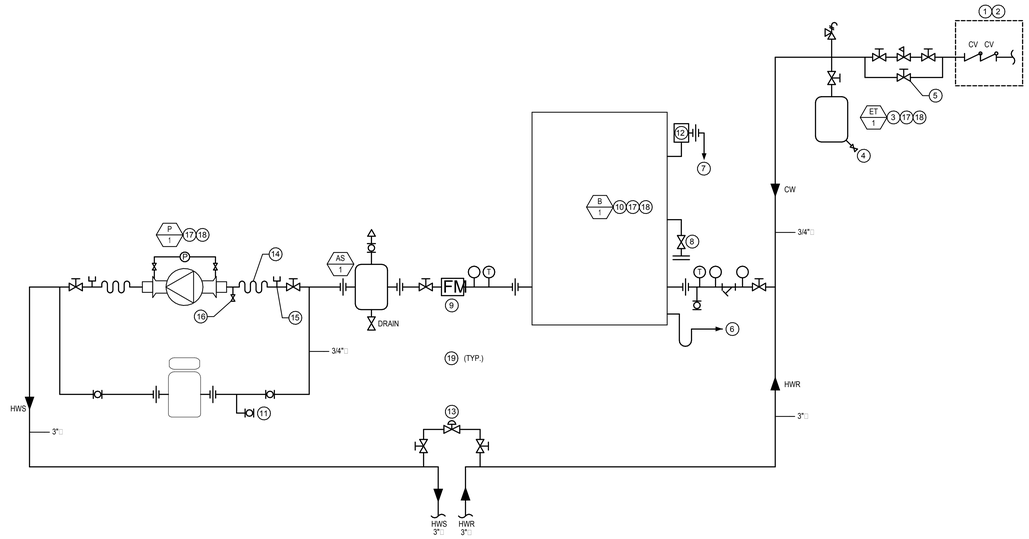
Drawing Number: **M503**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231



NOTES:

1. CW MAKEUP AND BFP BY PLUMBING CONTRACTOR
2. CONNECT TO SIDE OF MAIN (AVOID TOP OR BOTTOM CONNECTION TO PREVENT AIR OR DEBRIS FROM ENTERING PIPE TO EXPANSION TANK.
3. TANK CONNECTIONS MAY VARY DEPENDING ON TANK SIZE AND MODEL.
4. DRAIN VALVE REQUIRED TO PROPERLY RECHARGE TANK.
5. AUTOMATIC FILL VALVES AND QUICK FILL BYPASS.
6. ROUTE CONDENSATE TO NEW CONDENSATE NEUTRALIZE AND TO FLOOR SINK. CONDENSATE WORK BY PLUMBING CONTRACTOR. CONDENSATE NEUTRALIZER BY MECHANICAL CONTRACTOR.
7. RELIEF VALVE PIPE TERMINATION TO TOP OF FLOOR SINK. PIPE RUNOUT TO BE FULL SIZE.
8. DRAIN VALVE WITH MALE HOSE CONNECTION.
9. INSTALL FM/BTU METER ON BOILER SIDE OF BYPASS VALVE. ASSOCIATED TEMPERATURE SENSORS NOT SHOWN ON THIS PLAN. PROVIDE STRAIGHT PIPE RUN UPSTREAM AND DOWNSTREAM OF FLOW METER PER MANUFACTURER'S RECOMMENDATIONS (NO LESS THAN 24 ").
10. PROVIDE LOW WATER CUTOFF, SAFETY VALVES, AND CONTROLS PER CMC 1009, 1010, 1011.
11. ROUTE TO DRAIN.
12. RELIEF VALVE.
13. BYPASS VALVE. SET TO PROVIDE MINIMUM BOILER FLOW (PER MANUFACTURER'S INSTRUCTIONS) + 15% SAFETY FACTOR.
14. FLEXIBLE CONNECTOR. DUAL SPHERE NEOPRENE FLEX CONNECTORS (TYP).
15. PROVIDE MINIMUM FIVE PIPE DIAMETERS STRAIGHT LENGTH BETWEEN PUMP INLET AND NEAREST WATER OBSTRUCTION (VALVE, FITTING, ELBOW, ETC.).
16. 3/4" DRAIN VALVE.
17. EQUIPMENT SHALL BE SUPPORTED PER MANUFACTURER'S REQUIREMENTS.
18. A QUALIFIED PROFESSIONAL ENGINEER SHALL SIGN AND SEAL DESIGN CALCULATIONS AND SEISMIC RESTRAINT DETAILS PER VA STANDARDS AND CODE REQUIREMENTS.
19. NOT ALL WELLS AND FITTINGS SHOWN REQUIRED FOR CONTROL SENSORS. SEE CONTROLS DETAIL.

HEATING HOT WATER SYSTEM SCHEMATIC PIPING DIAGRAM (1)

100% CONSTRUCTION DOCUMENTS

three inches = one foot
one and one half inches = one foot
one inch = one foot
three quarters inch = one foot
one half inch = one foot
three eighths inch = one foot
one quarter inch = one foot
one eighth inch = one foot

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL DETAILS**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number: **648**

Drawing Number: **M504**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231

ROOFTOP DX AIR CONDITIONING UNIT SCHEDULE

UNIT NO.	SERVICE	LOCATION	TYPE (CAV/VAV)	REFRIGERANT	SUPPLY FAN				RETURN FAN				EVAPORATOR COIL								CONDENSER FAN (S)		COMPRESSOR		FILTER			ELECTRIC DATA					PHYSICAL DATA		BASIS OF DESIGN		REMARKS
					CFM	ESP (IN WG)	RPM	FAN HP	CFM	ESP (IN WG)	RPM	FAN HP	CAPACITY (MBH)		EAT		LAT		MAX. FACE VEL (FPM)	MIN. NO. ROWS	QTY.	EDB °F	QTY.	TOTAL KW/HP	TYPE	MAX. VEL (FPM)	INITIAL SP (IN WG)	V/PH/HZ	MOCP	MCA	FLA	V/PH/HZ	LxWxH (FT)	WEIGHT (LB)	MANUFACTURER	MODEL NO.	
													TOTAL	SENSIBLE	DB °F	WB °F	DB °F	WB °F																		
AC-1	BUILDING	ROOF	VAV	R-410A	21,000	1.5	1164	15x2	21,000	1.0	744	7.5x2	690	520	80	67	60	59	420	4	1	95	4		NOTE 8	500	0.53000	460/3/60	200	162	152	120/1 (CONTROL CIRCUIT)	38x8.5x8.5	18,500	AAON	RL-060	1 - 14

NOTES:

1. SIDE DISCHARGE AND INLET.
2. FIELD PROVIDE AND INSTALL DUCT SMOKE DETECTOR AT SUPPLY AND RETURN DUCT TO SHUT DOWN UNIT UPON DETECTION OF SMOKE.
3. CONNECT TO BMS SYSTEM. SEE SPECIFICATIONS FOR BMS DETAIL. SEE CONTROLS SHEET FOR DIAGRAM AND POINTS LIST.
4. DRAW THROUGH COIL.
5. DOUBLE WALL CASING WITHOUT PERFORATIONS.
6. INSULATED, STAINLESS STEEL, DOUBLE WALL, DOUBLE SLOPED DRAIN PAN.
7. COPPER TUBE, ALUMINUM FIN DX COOLING COIL.
8. TWO PRE FILTERS UPSTREAM OF COILS: MERV 7-2" AND MERV 14-12"
9. MANUAL DIAL TYPE PRESSURE GAUGE WITH AIR TUBING AND 3 ISOLATION BALL VALVES TO MEASURE PRESSURE DIFFERENTIAL ACROSS EACH FILTER.
10. VFD FOR SUPPLY AND RETURN FACTORY PROVIDED AND INSTALLED.
11. EVAPORATIVELY COOLED CONDENSER COILS. PROVIDE WITH WATER TREATMENT CONTROLLER.
12. SINGLE 460V ELECTRIC CONNECTION PROVIDED W/ STEPDOWN TRANSFORMER FOR 120V CONVENIENCE OUTLET.
13. COMPRESSOR ON VFD FOR CAPACITY CONTROL
14. CONDENSER FAN ON VFD FOR HEAD PRESSURE CONTROL

FIRE SMOKE DAMPER SCHEDULE

UNIT NO.	SIZE. (IN)	BASIS OF DESIGN	
		MANUFACTURER	MODEL NO.
FSD-1	SEE PLANS	POTORFF	FSD-151
FSD-2	SEE PLANS	POTORFF	FSD-125R

NOTES:
1. ELECTRIC ACTUATOR.
2. HARD WIRED SMOKE DETECTOR.
3. TS-150 END SWITCH PACKAGE.
4. PROVIDE WITH LOCAL AUDIBLE & VISIBLE ALARMS AND A REMOTE ALARM AT THE ECC.

ROOM AIR BALANCE REQUIREMENTS

ROOM/AREA TYPE	RETURN/EXHAUST AIR BALANCE REQUIREMENT
EXAM	NEUTRAL: EQUAL AIR IN-OUT.
ISOLATION EXAM	NEGATIVE: AIR OUT 15% MORE THAN AIR IN.
CORRIDOR	POSITIVE: AIR OUT 15% MORE THAN AIR IN.
TOILET	VERY NEGATIVE: AIR OUT 30% MORE THAN AIR IN.
JANITORS CLOSET	

PUMP SCHEDULE

UNIT NO.	SERVICE	LOCATION	FLUID DATA						PUMP DATA				MOTOR				DRIVE TYPE	DIMENSIONAL DATA		VIBRATION ISOLATION			BASIS OF DESIGN		REMARKS
			TEMP (°F)	FLUID	GPM	TDH (FT)	TDH (PSI)	OPERATING PRESSURE (PSI)	TYPE	BHP	RPM	NPSH REQ. (FT.)	EFF.	HP	RPM	V/PH/HZ		LxWxH (IN)	WEIGHT (LB.)	SPECIFICATION		MIN. STATIC DEFLECTION (IN)	MANUFACTURER	MODEL NO.	
																				MOUNTING TYPE	BASE TYPE				
P-1	HHW	ROOF	180	WATER	65	30		250	INLINE	0.7	1765	5.6	72%	2	1800	460/3/60	DIRECT	16x11x25	143	SPRING	INLINE	2	PACO	20705VL	1,2,3,4

NOTES:

1. OVERSIZE IMPELLER FOR 47 FT HEAD, 95 GPM. REDUCE PUMP SPEED TO ACHIEVE OPERATING POINT SHOWN ABOVE.
2. OUTDOOR RATED INLINE PUMP.
3. TEFC MOTOR, NEMA PREMIUM EFFICIENCY.
4. PROVIDE WITH VFD, CONNECT TO BMS SYSTEM. MECHANICAL TO PROVIDE, ELECTRICAL TO INSTALL.

VAV BOX SCHEDULE

UNIT NO.	SPACE SERVED	INLET SIZE	CFM		HOT WATER COIL					NC		ΔP IN. WG. FULL OPEN	MIN INLET PRESS (IN H_2O)	INLET DIAM. (IN)	BASIS OF DESIGN	
			MAX	MIN	CAPACITY (MBH)	EWT/LWT (°F)	EAT/LAT (°F)	APD (IN WG)	GPM	DISCHARGE	RADIATED				MANUFACTURE	MODEL NO.
VAV-1-1	D104 & D102	8" Ø	430	280	5.6	140/120	55/85	0.2	0.6					8	KRUGER	LMHS
VAV-1-2	D106, D108 & E118	10" Ø	610	320	8.6	140/120	55/85	0.2	0.9					8	KRUGER	LMHS
VAV-1-3	E112 & E110	6" Ø	295	260	5.5	140/120	55/85	0.2	0.6					6	KRUGER	LMHS
VAV-1-4	E108, E106 & E101	8" Ø	500	340	7.6	140/120	55/85	0.2	0.8					12	KRUGER	LMHS
VAV-1-5	A107 & A105	8" Ø	490	190	5.1	140/120	55/85	0.2	0.5					8	KRUGER	LMHS
VAV-1-6	A103,	12" □	1100	200	8.0	140/120	55/85	0.2	0.8					6	KRUGER	LMHS
VAV-1-7	A104, A102, A101, B107, B105, B103 & B101	14" Ø	1145	840	14.0	140/120	55/85	0.2	1.4					14	KRUGER	LMHS
VAV-1-8	B106	6" Ø	345	140	2.2	140/120	55/85	0.2	0.2					8	KRUGER	LMHS
VAV-1-9	C107, C105, B104 & B102	10" Ø	680	410	6.5	140/120	55/85	0.2	0.7					8	KRUGER	LMHS
VAV-1-10	C103, 14, 13, 19	24X16"	2800	1840	35.8	140/120	55/85	0.2	3.6					24X16	KRUGER	LMHS
VAV-1-11	C106, C104, C102 & C101	12" Ø	770	710	11.5	140/120	55/85	0.2	1.2					10	KRUGER	LMHS
VAV-1-12	D107, D105, D103, D101 & E101	12" Ø	1000	720	1.6	140/120	55/85	0.2	0.2					14	KRUGER	LMHS
VAV-2-1	D203 & D205	8" Ø	395	395	6.4	140/120	55/85	0.2	0.7					8	KRUGER	LMHS
VAV-2-2	D201, E220, E218 & E216	14" Ø	1340	410	13.5	140/120	55/85	0.2	1.4					10	KRUGER	LMHS
VAV-2-3	E214, E212, E210 & E208	10" Ø	700	360	9.5	140/120	55/85	0.2	1.0					10	KRUGER	LMHS
VAV-2-4	E206 & E204	6" Ø	300	180	4.6	140/120	55/85	0.2	0.5					6	KRUGER	LMHS
VAV-2-5	E201 & E203	10" Ø	680	360	8.5	140/120	55/85	0.2	0.9					10	KRUGER	LMHS
VAV-2-6	A203	8" Ø	520	320	6.7	140/120	55/85	0.2	0.7					8	KRUGER	LMHS
VAV-2-7	B207, B205, B203, B201 & E201	14" Ø	1360	960	15.5	140/120	55/85	0.2	1.6					12	KRUGER	LMHS
VAV-2-8	B206	6" Ø	340	140	2.2	140/120	55/85	0.2	0.3					8	KRUGER	LMHS
VAV-2-9	B202, 23 & 24	24"X16"	2550	2120	50.7	140/120	55/85	0.2	5.1					24X16	KRUGER	LMHS
VAV-2-10	C203, B204 & C205	8" Ø	510	370	6.0	140/120	55/85	0.2	0.6					10	KRUGER	LMHS
VAV-2-11	C206, C204, C202 & C201	10" Ø	700	570	9.2	140/120	55/85	0.2	1.0					8	KRUGER	LMHS

NOTES:

1. CONNECT TO BMS SYSTEM. 24V DDC CONTROLLER TO BE PROVIDED BY CONTROLS CONTRACTOR. MOUNTED BY FACTORY.
2. FIELD ADJUSTABLE MAX AND MIN AIRFLOW.
3. MAXIMUM SUPPLY AIR TEMPERATURE SHALL NOT EXCEED 95°F.

EXHAUST FAN SCHEDULE

FAN NO.	SERVICE	LOCATION	PERFORMANCE DATA					CONSTRUCTION DATA ARRANGEMENT			MOTOR DATA			DIMENSIONAL DATA		VIBRATION ISOLATION			BASIS OF DESIGN		REMARKS
			CFM	SP (IN)	OUTLET VEL. (FPM)	BHP	RPM	FAN TYPE	WHEEL SIZE (IN)	DRIVE TYPE	HP	V/PH/HZ	STARTER TYPE	LxWxH (IN)	OPERATING WEIGHT (LB)	SPECIFICATION		MIN. STATIC DEFLECTION (IN)	MANUFACTURER	MODEL NO.	
																MOUNTING TYPE	BASE TYPE				
EF-1	GENERAL EXHAUST	ROOF	1,070	0.75		0.246	1436	DOWN BLAST	12"	BELT	1/4	115/1/60		29x29x27	98	CURB	FLAT	-	LOREN COOK	120C3B	1
EF-2	ISOLATION ROOMS	ROOF	800	1.0		0.293	2100	UTILITY	10"	BELT	1/2	115/1/60		21x28x31	209	SPRING	FLAT	1"	LOREN COOK	100CPS	2

NOTES:

1. ODP MOTOR ENCLOSURE, BIRD SCREEN, BELT TENSIONER, GRAVITY DAMPER, AND ROOF CURB.
2. PROVIDE WITH VFD, ISOLATION AND FACTORY SUPPLIED BELT TENSIONER, WELDED SEAM CONSTRUCTION, GRAVITY DAMPER, ACCESS DOOR, SCROLL DRAIN AND OSHA APPROVED WEATHER COVER.

BOILER SCHEDULE

UNIT NO.	LOCATION	TYPE	BOILER PERFORMANCE DATA				BURNER PERFORMANCE DATA							REMARKS
			NOMINAL CAPACITY	GPM	EWT (°F)	LWT (°F)	GAS	MOTOR						
			MBH				MIN. PRESS. IN H2O	HP	VOLT	PH	HZ	MFR	MODEL	
B-1	ROOF	CONDENSING	750	65	120	140	3.5	0.4	120	1	60	PATTERSON KELLY	MACH C-750	1-3

NOTE:

1. OUTDOOR RATED BOILER.
2. CONNECT TO BMS.
3. VARIABLE PRIMARY FLOW CONFIGURATION.

100% CONSTRUCTION DOCUMENTS

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL SCHEDULES**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number: **648**

Drawing Number: **M601**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231

VARIABLE FREQUENCY DRIVE SCHEDULE

UNIT MARK		CERUS CIE3R-BYP002-P
	OPERATING MODE	DESIGN
	SERVICE	P-1 HW
	QTY. / LOCATION (INDOOR/OUTDOOR)	1 / OUTDOOR
ELECTRICAL		
	MOTOR HP	2.0
	MAX. MOTOR RPM	1,800
	MOTOR VOLTAGE	460-3-60
OPTIONS		
	WEATHER-PROOF ENCLOSURE	YES - NEMA 3R
	INTEGRAL DISCONNECT	YES
	INTEGRAL BYPASS	YES
	BMS COMMUNICATION CARD	YES

NOTES/REMARKS:

1. DRIVES SHALL INCLUDE MANUAL 3-CONTACTOR BYPASS, CIRCUIT BREAKER DISCONNECT, HOA SWITCH, LINE REACTORS.5 YEAR WARRANTY AND AUTHORIZED FACTORY STARTUP. SEE VFD CONTROL DIAGRAM FOR ADDITIONAL DETAILS ON CONTROLS DRAWING.

SPLIT SYSTEM INDOOR FAN COIL UNIT SCHEDULE

UNIT TAG	MANUFACTURER	UNIT TYPE	MODEL	SERVICE	ASSOCIATED CONDENSING UNIT ON ROOF	LOCATION	SUPPLY AIR	MIN. OUTSIDE AIR	EVAPORATOR ENTERING AIR TEMPERATURES		COOLING CAPACITY	HEATING CAPACITY	ELECTRICAL			OPERATING WEIGHT (LBS)	REMARKS
							CFM	CFM	DBT (°F)	WBT (°F)	TOTAL (MBH)	TOTAL (MBH)	MCA (AMP)	MOCP (AMP)	SERVICE V/HZ/PH		
FC-1-1	MITSUBISHI	DUCTED	PEAD-A24A	MAIN ELEC. ROOM	CU-1	MAIN ELEC ROOM	920	NA	95	71	24.0	NA	2.63	--	208 / 60 / 1	50	1-6, 8
FC-1-2	MITSUBISHI	DUCTED	PEAD-A24A	TELE DATA ROOM	CU-2	CORRIDOR	920	NA	95	71	24.0	NA	2.63	--	208 / 60 / 1	50	1-7
FC-1-3	MITSUBISHI	WALL MOUNT	PKA-A24KA	ELEV. MECH ROOM	CU-3	ELEV MECH ROOM	920	NA	95	71	24.0	NA	1.00		208 / 60 / 1		1-8

NOTES:

1. INSTALL FAN COIL AS RECOMMENDED BY THE UNIT MANUFACTURER. SEE MECHANICAL DETAILS FOR MOUNTING.
2. PROVIDE UNIT WITH MANUFACTURER SUPPLIED CONDENSATE WATER PUMP.
3. PROVIDE MFR SUPPLIED, WALL MOUNTED WIRED THERMOSTAT.
4. INDOOR FAN COIL UNIT IS POWERED FROM OUTDOOR CONDENSING UNIT USING A-CONTROL. COORDINATE WITH DIV. 26 TO PROVIDE CONDUIT AND WIRING ACCORDINGLY.
5. PROVIDE UNIT WITH FACTORY SUPPLIED REFRIGERANT LINE SETS OF REQUIRED LENGTH.
6. COOLING ONLY UNIT. PROVIDE UNIT WITH BACNET COMMUNICATION INTERFACE MODULE TO CONNECT TO THE BUILDING BMS TO MONITOR SPACE TEMPERATURE.
7. PROVIDE ON EMERGENCY POWER.
8. CONTRACTOR TO PROVIDE AND INSTALL A SHOP FABRICATED SECONDARY DRAIN PAN BELOW FAN COIL UNIT AND CONDENSATE PUMP FOR SECONDARY CONDENSATE DRAINAGE.

EXPANSION TANK SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	TYPE	APPROX SYSTEM VOLUME		SYSTEM TEMPERATURE RANGE				INITIAL PRESSURE IN TANK		MAX OPERATING PRESSURE		FILL PRESSURE AT TANK				REQUIRED EXPANSION VOLUME		REQUIRED EXPANSION TANK SIZE		PIPE SIZE TO TANK		COLD WATER FILL SIZE		REMARKS
						MIN		MAX						RELIEF VALVE		AT TANK										
				GAL	[L]	°F	[°C]	°F	[°C]	PSIG	[kPa]	PSIG	[kPa]	PSIG	[kPa]	PSIG	[kPa]	GAL	[L]	GAL	[L]	IN	[mm]	IN	[mm]	
ET-1	ROOF	HEATING HOT WATER	BLADDER TANK	800		40	[4]	140	[60]	12	[83]	125	[860]	75		75		12.1		17.2		1				B&G B130-LA

HOT WATER FINNED TUBE RADIATION SCHEDULE

MARK	LOCATION	AREA SERVED	TYPE	ENCLOSURE TYPE	MOUNTING	SIZE (INCHES)		CAPACITY		TEMPERATURES				FLOW		MAX WPD		REMARKS
										EWT		LWT						
						W	H	BTUH	[W]	°F	[°C]	°F	[°C]	GPM	[L/s]	FT	[Pa]	
HWR-1	ENTRY RM:11	ENTRY RM:11	TUBE		WALL	61	84	11823		140		120		1.2		0.5		1
NOTE																		

1. RUNTAL: RV-21, A TYPE CONNECTION, LEFT HAND SUPPLY, HIGH PRESSURE PIPING, CONFIRM COLOR WITH ARCHITECT.

AIR FILTER SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	MERV RATING	AIR FLOW		APD				HOUSING TYPE	CARTRIDGES				REMARKS
							INITIAL		CHANGEOVER			#	SIZE		ARRANGEMENT	
					CFM	[L/s]	IN	[mm]	IN	[mm]			IN	[mm]		
PF-1	AC-1	ENTIRE BLDG	AC-1	7	21000		0.35		1	[25]	PANEL					
AF-1	AC-1	ENTIRE BLDG	AC-1	14	21000		0.53		1	[25]	BOX					
PF-2B	FC-1-1	ELEC ROOM	FC-1-1	8							PANEL					
PF-3	FC-1-2	TELE DATA	FC-1-2	8							PANEL					
PF-4	FC-1-3	ELEVATOR	FC-1-3	8							PANEL					

SPLIT SYSTEM OUTDOOR AIR COOLED CONDENSING UNIT SCHEDULE

TAG	MANUFACTURER	MODEL	SERVICE	LOCATION	DESIGN AMBIENT AIR TEMP	ELECTRICAL CONNECTION			SEER	OPERATING WEIGHT LBS.	FACTORY CHARGED REFRIGERANT	REMARKS
						MCA	MOCP	V/HZ/PH				
CU-1	MITSUBISHI	PUY-A24NHA	FC-1-3	ROOF	87	18	30	208/60/1	17	175	R410A	1, 2, 3, 4
CU-2	MITSUBISHI	PUY-A24NHA	FC-1-2	ROOF	87	18	30	208/60/1	17	175	R410A	1, 2, 3, 4
CU-3	MITSUBISHI	PUY-A24NHA3	FC-1-3	ROOF	87	18	30	208/60/1	17	175	R410A	1, 2, 3, 4

NOTES:

1. PROVIDE CONDENSING UNIT WITH LOW AMBIENT CONTROLS FOR OPERATION AT 20 DEGREE F AMBIENT TEMPERATURE.
2. UNIT DISCONNECT BY ELECTRICAL DIV. 26.
3. MOUNT CONDENSING UNIT ON SLEEPERS ON ROOF. SEE MECHANICAL DETAILS FOR MOUNTING.
4. WALL MOUNTED WIRED CONTROLLER MODEL #PAR-21MAA FOR ALL UNITS.

AIR SEPARATOR SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	TYPE	AIR SEPARATOR						REMARKS
				SIZE IN		FLOW		WPD	BUILT-IN STRAINER REQ'D	
				IN	[mm]	GPM	[L/s]	FT [kPa]		
AS-1	ROOF	HEATING WATER	TANGENTIAL	2 1/2"		65		0.65		ROLAIRTROL RL-2-1/2N

AIR DEVICE SCHEDULE

MARK NO.	MANUFACTURER	MODEL	FLOW PATTERN	FRAME SIZE	NECK SIZE	REMARKS
LD-1	TITUS	TBD-80	180 DEG ADJ.	4'	SEE PLANS	3 SLOT, 4 FEET LONG, 1-1/2" SLOT WIDTH, INSULATED PLENUM
CD-1	TITUS	OMNI	4-WAY, ADJ.	24" x 24"	SEE PLANS	
CR-1	TITUS	PAR	-	24" x 24"	SEE PLANS	
WSD-1	TITUS	132 RS	2-WAY	SEE PLANS	SEE PLANS	3" SPACING

100% CONSTRUCTION DOCUMENTS

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL SCHEDULES**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number: **648**

Drawing Number: **M602**

Dwg. of

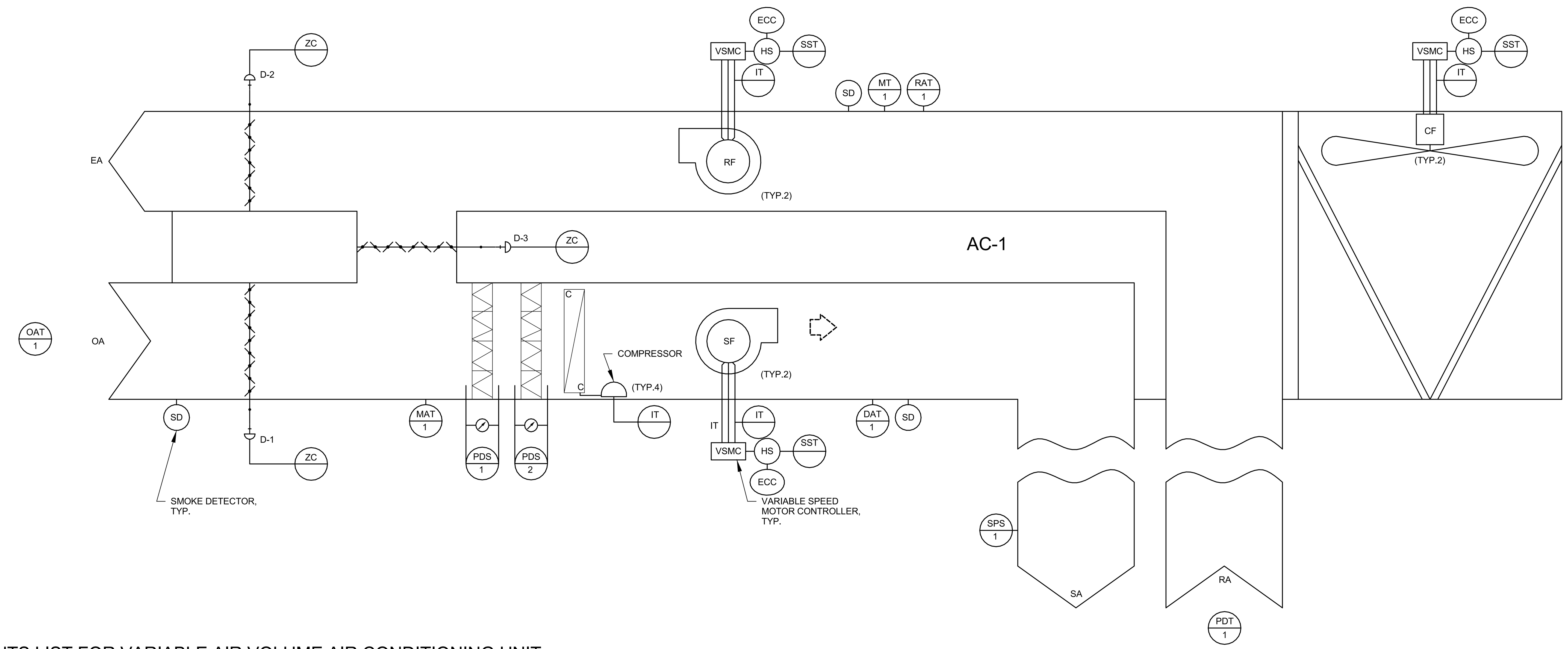
Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231

CONTROLS SYMBOLS

T	ROOM THERMOSTAT/TRANSMITTER - WALL MOUNT
M	ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER - WALL MOUNT
TT	TEMPERATURE TRANSMITTER
TT	TEMPERATURE TRANSMITTER, AVERAGING ELEMENT
MT	MOISTURE (HUMIDITY) TRANSMITTER
PT	PRESSURE TRANSMITTER
SPS	STATIC PRESSURE SENSOR
FT	FLOW TRANSMITTER
IT	CURRENT TRANSMITTER
CT	CONDUCTIVITY TRANSMITTER
SD	SMOKE DETECTOR
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PDS	PRESSURE DIFFERENTIAL SWITCH
HS	HAND SWITCH (HAND-OFF-AUTO SWITCH)
ZC	VALVE OR DAMPER POSITION CONTROLLER
KR	LOCAL RECORDING TIME CLOCK (RUNTIME)
TSL	TEMPERATURE SWITCH, LOW (FREEZESTAT)
TSH	TEMPERATURE SWITCH, HIGH (FREEZESTAT)
LC	LEVEL CONTROLLER
LT	LEVEL TRANSMITTER
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
EPT	ELECTRONIC TO PNEUMATIC TRANSDUCER
AT CO2	CARBON DIOXIDE TRANSMITTER
AT CO	CARBON MONOXIDE TRANSMITTER
AT OC	OCCUPANCY SENSOR
LTCP	LOCAL TEMPERATURE CONTROL PANEL
HVAC	HVAC CONTROL PANEL
VSMC	VARIABLE SPEED MOTOR CONTROLLER
ECC	INTEGRATE CONTROL POINT ON REMOTE GRAPHICS WORKSTATION AT ENERGY CONTROL CENTER
TC	TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATION
PC	PRESSURE CONTROLLER. SEE SEQUENCE OF OPERATION
SC	SPEED CONTROLLER. SEE SEQUENCE OF OPERATION
FC	FLOW CONTROLLER. SEE SEQUENCE OF OPERATION
FSH	FLOW SWITCH HIGH
FSL	FLOW SWITCH LOW
KC	TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE
	TEMPERATURE SENSING ELEMENT FOR TRANSMITTING TEMPERATURE TO EMCS (PROVIDE 12 INCHES [200mm] MINIMUM LENGTH IN DUCT WHEN SPACE PERMITS.)
A	SENSOR WITH AVERAGING ELEMENT TO TRANSMIT TEMPERATURE TO EMCS
	MOTOR STARTER
M	ELECTRIC OPERATED CONTROL DAMPER/OR VALVE



POINTS LIST FOR VARIABLE AIR VOLUME AIR CONDITIONING UNIT

JOB: -
BUILDING: VA MATHER MEDICAL SPECIALTIES BUILDING
PAGE:

SYSTEM:
VAV AIR CONDITIONER
AC-1

SYSTEM COMPONENT	POINT ID	ABBREVIATION	PRIORITY/ADD-ALTERNATE NO.	--	ELECTRIC DEVICE	START/STOP	OPEN/CLOSE	--	SPEED COMMAND	VALVE POSITION	DAMPER POSITION	STATUS	ALARM	PRESSURE	HIGH HUMIDITY	HIGH STATIC PRESSURE	LOW TEMPERATURE	--	TEMPERATURE (TI)	PRESSURE	POSITION	FLOW	PERCENT	STATIC PRESSURE	CARBON MONOXIDE	HUMIDITY	VACUUM	Local Alarm Panel	Area Alarm Panel	Master Alarm Panel	HIGH LIMIT	LOW LIMIT	--	--	SCHEDULE START/STOP	FUNCTION	DUTY CYCLE	TEMPERATURE ECONOMIZER	ENTHALPY ECONOMIZER	TEMPERATURE RESET	DEMAND LIMITING	TEMPERATURE OVERRIDE	STATIC PRESSURE RESET	--	--	PRESSURE/VOLUME CONTROL	FAILURE MODE	SPACE TEMP. CONTROL	FULL COMMUNICATION	TRENDING	REMARKS
			POINT LEGEND			SYSTEM OUTPUTS BINARY			ANALOG			SYSTEM INPUTS BINARY							ANALOG									SYSTEM SOFTWARE/CONTROL ALARM PROCESSING							APPLICATION/FUNCTION																
MIXED AIR TEMPERATURE	AI-1	MAT-1											o						o													o																		o	
DISCHARGE AIR TEMPERATURE	AI-2	DAT-1											o						o																					o										o	
SUPPLY STATIC PRESSURE	AI-3	SPS-1											o											o							o											o							o	
OUTSIDE AIR TEMPERATURE	AI-4	OAT-1																	o																															o	
PRE-FILTER PRESSURE	AI-5	PDS-1												o																	o																			o	
SUPPLY FAN 1 STATUS	BI-1	SF-STS										o																																						o	
SUPPLY FAN 1 VSMC ALARM	BI-2	SF-ALA											o																																					o	
SUPPLY FAN 1 VSMC	AO-1	SF-SPD							o														o																										o	o	
RETURN FAN 1 STATUS	BI-3	RF-STS										o																																						o	
RETURN FAN 1 VSMC ALARM	BI-4	RF-ALA											o																																					o	
RETURN FAN 1 VSMC	AO-2	RF-SPD							o														o																										o	o	
OUTSIDE AIR DAMPER	AO-3	ZC D-1					o				o												o															o												o	
EXHAUST AIR DAMPER	AO-4	ZC D-2					o				o												o															o												o	
MIXED AIR DAMPER	AO-5	ZC D-3					o				o												o															o												o	
SUPPLY FAN 1 START/STOP	BO-1	SF-SST				o																													o															o	
RETURN FAN 1 START/STOP	BO-2	RF-SST				o																													o															o	
COMPRESSOR 1 STATUS	BI-5	IT										o																																						o	
COMPRESSOR 2 STATUS	BI-6	IT										o																																						o	
COMPRESSOR 3 STATUS	BI-7	IT										o																																						o	
COMPRESSOR 4 STATUS	BI-8	IT										o																																						o	
RETURN AIR TEMPERATURE	AI-6	RAT-1																	o																															o	
SPACE PRESSURE	AI-7	PDT-1																		o																														o	
RETURN HUMIDITY	AI-8	MT-1																									o					o	o																			o	
SUPPLY FAN 2 STATUS	BI-9	SF-STS										o																																						o	
SUPPLY FAN 2 VSMC ALARM	BI-10	SF-ALA											o																																					o	
SUPPLY FAN 2 VSMC	AO-6	SF-SPD							o														o																										o	o	
RETURN FAN 2 STATUS	BI-11	RF-STS										o																																						o	
RETURN FAN 2 VSMC ALARM	BI-12	RF-ALA											o																																					o	
RETURN FAN 2 VSMC	AO-7	RF-SPD							o														o																										o	o	
SUPPLY FAN 2 START/STOP	BO-3	SF-SST				o																													o															o	
RETURN FAN 2 START/STOP	BO-4	RF-SST				o																													o															o	
FINAL FILTER PRESSURE	AI-9	PDS-2												o																	o																			o	
CONDENSER FAN 1 STATUS	BI-13	CF-STS										o																																						o	
CONDENSER FAN 1 VSMC ALARM	BI-14	CFALA											o																																					o	
CONDENSER FAN 1 VSMC	AO-8	CF-SPD							o														o																										o	o	
CONDENSER FAN 1 START/STOP	BO-5	CF-SST				o																													o															o	
CONDENSER FAN 2 STATUS	BI-15	CF-STS										o																																						o	
CONDENSER FAN 2 VSMC ALARM	BI-16	CFALA											o																																					o	
CONDENSER FAN 2 VSMC	AO-9	CF-SPD							o														o																										o	o	
CONDENSER FAN 2 START/STOP	BO-6	CF-SST				o																													o															o	

SEQUENCE OF OPERATION FOR VARIABLE AIR VOLUME AIR CONDITIONING UNIT

1. GENERAL

1.1 UNIT IS NORMALLY STARTED AND STOPPED REMOTELY AT THE ECC. H-O-A SWITCH SHALL BE KEPT IN THE "AUTO" POSITION. "HAND" AND "OFF" POSITIONS SHALL BE USED ONLY FOR MAINTENANCE. WHEN THE UNIT IS "OFF" D-1 & D-2 SHALL BE FULLY CLOSEDAND D-3 FULLY OPEN. WHEN THE UNIT IS "ON" D-1, D-2, & D-3 SHALL MODULATE BASED ON ECONOMIZER SEQUENCE.

2. TEMPERATURE CONTROL

2.1 SUPPLY AIR TEMPERATURE, SENSED BY DAT-1, SHALL BE MAINTAINED AT SETPOINT VIA DIGITAL CONTROL PANEL BY MODULATING COMPRESSOR SEQUENCE.

2.2 WHEN THE TEMPERATURE OF THE OUTSIDE AIR, SENSED BY OAT-1, IS BELOW THE SUPPLY AIR TEMPERATURE, SENSED BY DAT-1, COMPRESSORS SHALL MODULATE OPEN TO MAINTAIN THE SUPPLY AIR TEMPERATURE, SENSED BY DAT-1.

2.3 SUPPLY AIR TEMPERATURE SETPOINT SHALL BE RESET USING A TRIM AND RESPOND LOGIC FROM INITIAL SETPOINT OF 55°F TO 65°F BASED ON VAV BOX DAMPER POSITION.

3. AIR FLOW CONTROL

3.1 THE SUPPLY AIR FLOW SHALL BE CONTROLLED BY THE DIGITAL CONTROL PANEL MODULATING THE SUPPLY FANS VARIABLE SPEED MOTOR CONTROLLER TO MAINTAIN 1.0" [25mm] OF DUCT STATIC PRESSURE (FIELD ADJUSTABLE), SENSED BY SPS-1. RESET STATIC PRESSURE BASED ON ACTUAL BUILDING LOAD BY POLLING ALL VAV BOXES.

3.2 THE DIGITAL CONTROL PANEL, WILL MONITOR TOTAL SUPPLY AIR FLOW,

3.3 USING HIGH PRESSURE SENSOR SPS-1 LOCATED AT THE SUPPLY FAN DISCHARGE, SHALL PREVENT THE SUPPLY FAN FROM DEVELOPING OVER 3" [75mm] OF STATIC PRESSURE (FIELD ADJUSTABLE). IF STATIC PRESSURE AT SPS-1 DOES EXCEED 3" [75mm] THE SUPPLY AIR FAN SHALL STOP. SPS-1 SHALL BE HARDWIRED TO THE SUPPLY FAN VSMC AND UNIT SHALL BE SHUTDOWN IN HAND,AUTO OR BYPASS MODE. SPS-1 WILL REQUIRE MANUAL RESET AT THE DEVICE.

3.4 RETURN AIR FLOW SHALL BE MODULATED TO MAINTAIN SPACE DIFFERENTIAL PRESSURE OF 0.08"WC (ADJ.) AS SENSED BY PDT.

3.5 CONDENSER FANS SHALL STAGE & MODULATE BASED ON CONTROL STRATEGY FROM THE MANUFACTURERS PROVIDED CONTROL PANEL INTERNAL SEQUENCE OF OPERATIONS.

4. HUMIDITY CONTROL

4.1 SYSTEM SHALL MONITOR RETURN AIR HUMIDITY USING MT-1. ISSUE ALARM ON HIGH HUMIDITY LEVEL (ADJ.)

5. FREEZE PROTECTION

5.1 IF THE AIR TEMPERATURE AS SENSED BY DAT-1 FALLS BELOW 45°F [7°C], AN ALARM SIGNAL SHALL INDICATE AT THE DCP AND ECC. IF THIS TEMPERATURE FALLS BELOW 40°F [4.4°C], AS SENSED BY THE TSL THE SUPPLY AND RETURN FANS SHALL SHUT DOWN AND A CRITICAL ALARM SHALL INDICATE AT THE DIGITAL CONTROL PANEL AND ECC. TSL SHALL BE HARDWIRED TO THE SUPPLY FAN UFD AND UNIT SHALL BE SHUTDOWN IN HAND,AUTO OR BYPASS MODE. TSL WILL REQUIRE MANUAL RESET AT THE DEVICE.

6. AUTOMATIC SHUTDOWN/RESTART

6.1 WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR, SD, THE SUPPLY & RETURN FANS SHALL SHUT "OFF" AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. ALL SMOKE DAMPERS IN THE SUPPLY AND RETURN DUCTS SHALL CLOSE.

6.2 FANS SHALL RESTART AND SMOKE DAMPERS SHALL OPEN WHEN FIRE ALARM CIRCUIT IS RESET.

7. EMERGENCY CONSTANT SPEED OPERATION

7.1 UPON FAILURE OF THE VSMC, THE SUPPLY FANS SHALL BE STARTED/STOPPED MANUALLY AT THE DIGITAL CONTROL PANEL OR THE ECC THROUGH THE BY-PASS STARTER. FANS SHALL THEN BE OPERATED AT CONSTANT SPEED.

8. OA DAMPER

8.1 OA DAMPER WILL CLOSE WHENEVER AHU IS SHUT OFF.

AC CONTROL DIAGRAM 1

100% CONSTRUCTION DOCUMENTS

Revisions: | Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.
Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

HILLIARD ARCHITECTS
ESTABLISHED 1988
GOING GREEN
HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL CONTROLS DIAGRAM**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: 05/12/2014 | Checked: SHG | Drawn: SS

Project Number: 612-122

Building Number: 648

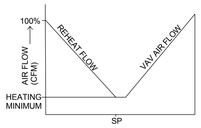
Drawing Number: **M603**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

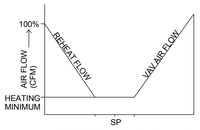
VA FORM 08-6231



VAV BOX CONTROL SEQUENCE

NO DEADBAND

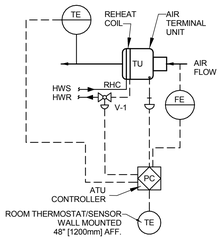
A. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
B. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING
C. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.



VAV BOX CONTROL SEQUENCE

W/DEADBAND

A. SET POINTS SHALL BE SET AS FOLLOWS:
COOLING 75°F (ADJ)
HEATING 70°F(ADJ)
DEADBAND OF 5° F BETWEEN HEATING AND COOLING SET POINTS WILL BE MAINTAINED.
B. UPON FALL IN SPACE TEMPERATURE THE VAV DAMPER WILL MODULATE TO MINIMUM POSITION.
C. UPON FURTHER DROP IN SPACE TEMPERATURE VALVE V-1 WILL MODULATE TO MAINTAIN SET POINT ± .5° F. THE ADJUSTABLE TOLERANCE OF ± .5° F HAS BEEN SELECTED TO PREVENT VALVE HUNTING
D. THE REVERSE SHALL OCCUR ON THE RISE IN SPACE TEMPERATURE.

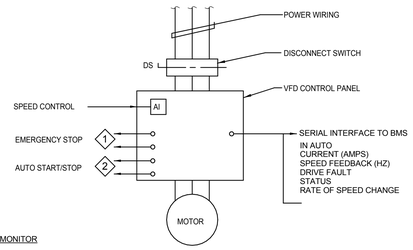


NO SUPPLEMENTAL HEATING

VARIABLE VOLUME AIR TERMINAL UNIT CONTROL DIAGRAM (5)

NOTES:

1. WIRE THRU SMOKE DETECTOR OR OTHER EMERGENCY SHUT DOWN CONTACTS. (JUMPER IF NOT REQUIRED).
2. WIRE THRU 'DO' OR OTHER AUTOMATIC START/STOP CONTACTS.

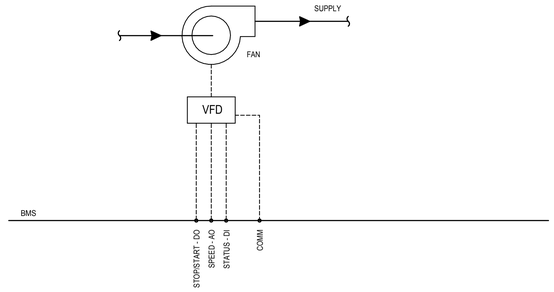


VFD INTERFACE MONITOR

A. EXHAUST FAN VFDS SHALL BE MONITORED AND CONTROLLED BY THE MFR INSTALLED AC CONTROLLER. EXHAUST FAN OPERATION SHALL BE INTERLOCKED WITH THE OPERATION WITH THE ROOF TOP AC UNITS.

B. STATUS AND OPERATING CONDITIONS SHALL BE MONITORED THROUGH THE DRIVE COMMUNICATION/SERIAL INTERFACE.

C. SEE SPECIFICATION SECTION 230993 FOR COMPLETE VFD POINT LIST.



VFD CONTROL DIAGRAM (3)

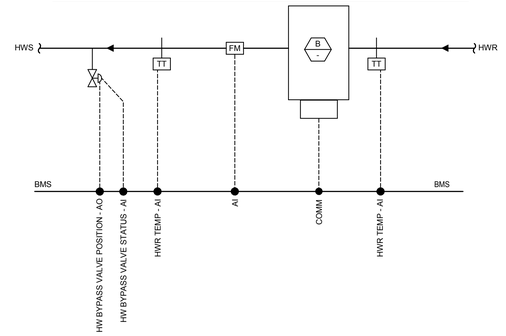
BOILER SEQUENCE OF OPERATION

BOILER SYSTEM CONSISTS OF ONE BOILER WITH PRIMARY VARIABLE PUMP CONFIGURATION.

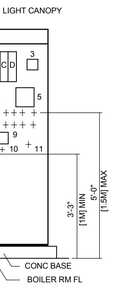
1. BOILER SYSTEM - RUN CONDITIONS: THE BOILER SYSTEM SHALL BE ENABLED TO RUN WHENEVER OUTSIDE AIR TEMPERATURE IS LESS THAN 65 DEG F (ADJ.).
2. TO PREVENT SHORT CYCLING, THE BOILER SYSTEM SHALL RUN FOR AND BE OFF FOR MINIMUM ADJUSTABLE TIMES (BOTH USER DEFINABLE), UNLESS SHUTDOWN ON SAFETIES OR OUTSIDE AIR CONDITIONS.
3. THE BOILER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.
4. THE BOILER SYSTEM SHALL ALSO RUN FOR FREEZE PROTECTION WHENEVER OUTSIDE AIR TEMPERATURE IS LESS THAN 38°F (ADJ.)
5. BOILER SAFETIES: THE FOLLOWING SAFETIES SHALL BE MONITORED:
   a. BOILER ALARM.
   b. LOW WATER LEVEL.
6. ALARMS SHALL BE PROVIDED AS FOLLOWS:
   a. BOILER ALARM.
   b. LOW WATER LEVEL ALARM.
7. HOT WATER PUMP:
   a. THE HOT WATER PUMP SHALL RUN ANYTIME THE BOILER IS CALLED TO RUN AND SHALL HAVE A USER DEFINABLE DELAY (ADJ.) ON STOP.
   b. ALARMS SHALL BE PROVIDED AS FOLLOWS:
      b.1. HOT WATER PUMP FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
      b.2. HOT WATER PUMP RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
      b.3. HOT WATER PUMP RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
   c. THE CONTROLLER SHALL MEASURE HOT WATER DIFFERENTIAL PRESSURE AND MODULATE THE HOT WATER PUMP VFD TO MAINTAIN ITS HOT WATER DIFFERENTIAL PRESSURE SETPOINT.
8. BOILER ENABLE: THE BOILER SHALL BE ENABLED WHEN THE BOILER SYSTEM IS COMMANDED ON. THE BOILER SHALL BE ENABLED AFTER PUMP STATUS IS PROVEN ON AND SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.
   a. ALARMS SHALL BE PROVIDED AS FOLLOWS:
      a.1. BOILER FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
      a.2. BOILER RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
      a.3. BOILER RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
   b. HOT WATER SUPPLY TEMPERATURE SETPOINT RESET: THE HOT WATER SUPPLY TEMPERATURE SETPOINT SHALL BE RESET BASED ON OUTSIDE AIR TEMPERATURE.
      b.1. AS OUTSIDE AIR TEMPERATURE RISES FROM 0°F (ADJ.) TO 70°F (ADJ.) THE HOT WATER SUPPLY TEMPERATURE SETPOINT SHALL RESET DOWNWARDS BY SUBTRACTING FROM 0°F (ADJ.) UP TO 20°F (ADJ.) FROM THE CURRENT BOILER SETPOINT.
   c. HOT WATER TEMPERATURE MONITORING: THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
      c.1. HOT WATER SUPPLY.
      c.2. HOT WATER RETURN.
      c.3. ALARMS SHALL BE PROVIDED AS FOLLOWS:
         c.3.1. HIGH HOT WATER SUPPLY TEMP: IF GREATER THAN 200°F (ADJ.).
         c.3.2. LOW HOT WATER SUPPLY TEMP: IF LESS THAN 100°F (ADJ.).
9. HOT WATER BYPASS VALVE: THE BYPASS VALVE SHALL MODULATE TO MAINTAIN BOILER MINIMUM FLOW RATE (ADJ.)

BOILER POINTS LIST

DESCRIPTION	VALUE	POINT TYPE						TRENDING AND ALARM						
		DIGITAL INPUT	DIGITAL OUTPUT	ANALOG INPUT	ANALOG OUTPUT	SOFTWARE POINT	HARDWARE POINT	ALARM	REMOTE ALARM NOTIFICATION	HIGH PRE-ALARM	HIGH ALARM	LOW PRE-ALARM	LOW ALARM	TRENDING
Boiler HW Supply Temp Setpt	Deg F				X		X						X	
Boiler Alarm Status		X				X		X						X
Low Water Level		X				X								X
Boiler Status		X				X								X
Boiler Enable			X			X								X
Boiler Failure		X				X		X						X
Boiler Running In Hand		X				X								X
High HW Supply Temp	Deg F	X				X		X						X
Low HW Supply Temp	Deg F	X				X		X						X
Low water level		X				X		X						X
HWS/R Differential Pressure	PSI			X		X								X
Boiler Firing Rate	%			X		X								X
Boiler Flow Switch		X				X								X
HWS Temperature	Deg F			X			X							X
HWR Temperature	Deg F			X			X							X
Boiler Bypass Valve Status	%			X			X							X
Boiler Bypass Valve Position	%				X		X							X
HW Energy (See BTU Meter)														



BOILER CONTROL DIAGRAM (1)

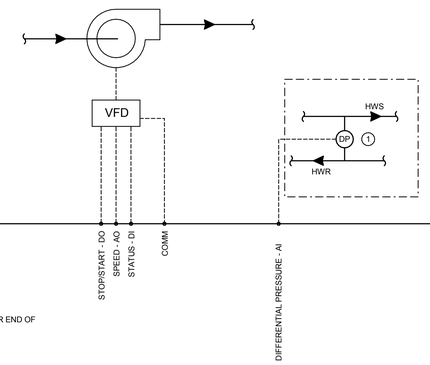


ELEVATION

ITEM NO. DESCRIPTION
1. ALARM BELL (WATER LEVEL)
2. 2 DRAFT GAGES
   A. WINDBOX
   B. FURNACE BOILER OUTLET
   C. ECONOMIZER OUTLET
3. ALARM HORN (FLAME FAILURE, LOW WATER CUTOUT)
4. ROW OF ALARM PILOT LIGHTS
5. BURNER CONTROL SYSTEM ANNUNCIATOR
6. ROW OF BURNER CYCLE PILOT-LIGHTS
7. ROW OF BURNER CONTROL SWITCHES
8. BOILER WATER LEVEL CONTROL STATION
9. ECONOMIZER TEMPERATURE INDICATOR
10. SELECTOR SWITCH FOR ECONOMIZER TEMPERATURE INDICATOR
11. BURNER STOP SWITCH

NOTES:
1. INTERIOR OF PANEL SHALL BE UTILIZED FOR MOUNTING RELAYS, BURNER CONTROL PROGRAMMER, AND OTHER DEVICES.
2. PROVIDE FRONT OR REAR ACCESS DOORS FULL HEIGHT AND WIDTH OF PANEL.
3. PANEL DIMENSIONS APPROX. 3'-0" (1 M) W x 1'-6" (0.5 M) D x 7'-6" (2.3 M) H.
4. WINDBOX AND FURNACE DRAFT GAGE SCALE RANGES RECOMMENDED BY BOILER AND BURNER MANUFACTURER.
5. SCALE RANGE OF BOILER OUTLET DRAFT GAGE MUST BE COORDINATED WITH ECONOMIZER DRAFT LOSS. IF THERE IS NO ECONOMIZER.
6. BOILER COMBUSTION CONTROL SUBMASTER, DRAFT CONTROL AND OXYGEN TRIM CONTROL STATIONS MAY BE LOCATED ON THIS PANEL.

BURNER CONTROL PANEL FOR WATER TUBE BOILERS (6)



NOTES:
1. PROVIDE LOW TEMP AND HIGH TEMP ALARMS AT ENGINEERING CONTROL CENTER. (ADJ.)

DOMESTIC HOT WATER HEATER - CONTROLS DIAGRAM (4)

NOTES:

LOCATE DP SENSOR NEAR END OF MAIN PIPE RUN.

HOT WATER PUMP POINTS LIST

DESCRIPTION	VALUE	POINT TYPE						TRENDING AND ALARM						
Monitor and Control Points	Units	DIGITAL INPUT	DIGITAL OUTPUT	ANALOG INPUT	ANALOG OUTPUT	SOFTWARE POINT	HARDWARE POINT	ALARM	REMOTE ALARM NOTIFICATION	HIGH PRE-ALARM	HIGH ALARM	LOW PRE-ALARM	LOW ALARM	TRENDING
On/Off			X											X
Status		X												X
Alarm		X						X						X
Loop Differential Pressure				X				X			X			X

HOT WATER PUMP CONTROL DIAGRAM (2)

100% CONSTRUCTION DOCUMENTS

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL CONTROLS DIAGRAMS**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **Author**

Project Number: **612-122**

Building Number: **648**

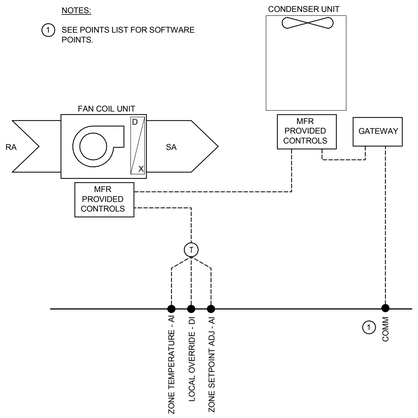
Drawing Number: **M604**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

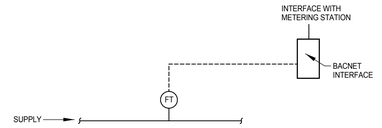
VA FORM 08-6231



SPLIT FAN COIL UNIT POINTS LIST

DESCRIPTION	VALUE	POINT TYPE						TRENDING AND ALARM						
INDOOR UNIT														
		DIGITAL INPUT	DIGITAL OUTPUT	ANALOG INPUT	ANALOG OUTPUT	SOFTWARE POINT	HARDWARE POINT	ALARM	REMOTE ALARM NOTIFICATION	HIGH PRE-ALARM	HIGH ALARM	LOW PRE-ALARM	LOW ALARM	TRENDING
Status	On/Off	X				X								X
Alarm		X				X		X						X
Fan Speed	High/Med/Low			X		X								X
AC Mode	Heat/Cool/Fan			X		X								X
Fan Status	On/Off	X				X								X
Local Remote Disable			X			X								
Start/Stop			X			X								X
Room Temp	Deg F			X			X							X
Local Temp Override	Deg F			X			X							X
Room Setpoint Temp	Deg F				X		X							X
OUTDOOR UNIT														
Compressor Satus	On/Off	X				X								X
Compressor Alarm		X				X		X						X

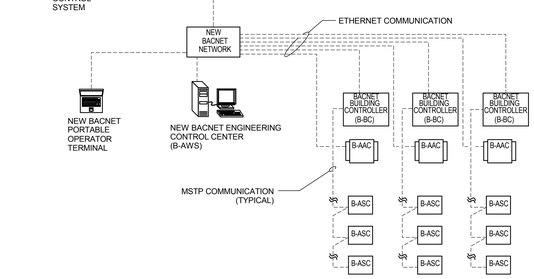
SPLIT FAN COIL UNIT CONTROLS DIAGRAM (6)



NOTE:

1. MAINTAIN UPSTREAM AND DOWN STREAM DISTANCES RECOMMENDED BY METER MANUFACTURES

WATER / GAS FLOW MEASURING STATION (3)



NOTES:
1. REPLACE EXISTING ECC WITH NEW BACNET (B-AWS) ENGINEERING CONTROL CENTER.

2. REPLACE ALL EXISTING CONTROLLERS WITH NEW BACNET CONTROLLERS.

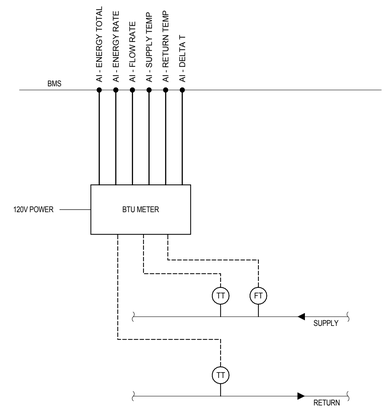
3. INSTALL NEW BACNET COMMUNICATION NETWORK.

4. INSTALL MULTIPLE BUILDING CONTROLLERS (B-BC) AS REQUIRED.

5. INSTALL NEW CONTROLLERS (B-AAC, B-ASC) AS REQUIRED.

6. PROVIDE NEW PORTABLE OPERATORS TERMINAL.

BACNET SYSTEM ARCHITECTURE (1)



TYPICAL BTU METER CONTROLS DIAGRAM (4)

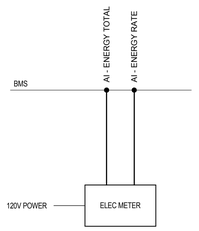
BMS SUBMETERING REQUIREMENTS

CATEGORY	ENERGY TYPE	REPORTED UNITS		
INTERIOR LIGHTING	ELECTRICITY	KWH	KW	
SPACE HEATING	NATURAL GAS	THERMS	KBTU/HR	EFFICIENCY
SPACE COOLING	ELECTRICITY	KWH	KW	EFFICIENCY
PUMPS	ELECTRICITY	KWH	KW	
FANS-INTERIOR	ELECTRICITY	KWH	KW	
SERVICE HOT WATER	ELECTRICITY	KWH	KW	EFFICIENCY
RECEPTACLE EQUIPMENT	ELECTRICITY	KWH	KW	
PROCESS ENERGY	ELECTRICITY	KWH	KW	

NOTES:

1. ELECTRICAL, BTU, AND GAS METERS SHALL BE INSTALLED TO MEASURE AND CONFIRM ENERGY USE, PEAK POWER AND EQUIPMENT EFFICIENCY FOR EACH CATEGORY NOTED ABOVE.
2. EQUIPMENT EFFICIENCY SHALL BE DEFINED AS (HEATING OR COOLING OUTPUT) / (ENERGY INPUT)
3. CONTROLS CONTRACTOR SHALL PULL ENERGY USE DATA FROM METERS INTO THE BMS FOR DATA PROCESSING AND ANALYSIS.
4. THE BMS SHALL AUTOMATICALLY GENERATE ANNUAL AND MONTHLY REPORTS THAT DISPLAY REPORTED UNITS FOR EACH CATEGORY.
5. CONTROLS CONTRACTOR SHALL PROVIDE SUBMETER. ELECTRICAL OR MECHANICAL CONTRACTOR SHALL INSTALL (AS APPLICABLE). CONTROLS CONTRACTOR SHALL INTEGRATE INTO BMS.
6. MORE THAN ONE SUBMETER MAY BE REQUIRED FOR EACH CATEGORY. SEE ELECTRICAL AND MECHANICAL PLANS FOR SUBMETER QUANTITIES.
7. CONTROLS CONTRACTOR SHALL PROVIDE ALL PROGRAMMING AND MATH TO COMBINE MULTIPLE METERS INTO EACH CATEGORY, AND OVERALL EQUIPEMENT EFFICIENCY.

BMS SUBMETERING LIST (2)



TYPICAL ELECTRIC METER CONTROLS DIAGRAM (5)

100% CONSTRUCTION DOCUMENTS

Revisions:	Date

CONSULTANTS:

SYSKA HENNESSY GROUP
A member company of SH Group, Inc.

Syska Hennessy Group, Inc.
425 California Street
Suite 700
San Francisco, CA 94104
Tel: 415.288.9060
Fax: 415.835.0385
www.syska.com

ARCHITECT/ENGINEERS:

ESTABLISHED 1988 HILLIARD ARCHITECTS GOING GREEN

HILLIARD ARCHITECTS, INC
251 Post Street, Suite 620
San Francisco, CA 94108-5017
Tel 415 989 6400, Fax 415 989 3056
www.HilliardArchitects.com

Drawing Title: **MECHANICAL CONTROLS DIAGRAMS**

Approved: Project Director

Project Title: **MED SPECIALTIES BUILDING 648**

Location: VA MATHER

Date: **05/12/2014** | Checked: **SHG** | Drawn: **SS**

Project Number: **612-122**

Building Number: **648**

Drawing Number: **M605**

Dwg. of

Office of Construction and Facilities Management

Department of Veterans Affairs

VA FORM 08-6231